2000 Atlantic Mackerel, *Loligo, Illex*
and Butterfish Specifications

Draft Environmental Assessment
Regulatory Impact Review
Initial Regulatory Flexibility Analysis

EFH Assessment

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EXECUTIVE SUMMARY 1
Introduction 2
Goals and Objectives of Current FMP 2
Management Unit 2
Loligo pealei 3
Biology and Distribution 3
Fishery Description 3
Status of the Stock Relative to Overfishing Definition and Quota Recommendations for *Loligo* 4
Other Management Measures for *Loligo* 5
Illex illecebrosus 6
Biology and Distribution 6
Description of the Fishery 6
Status of the Stock and Quota Recommendations for *Illex* 7
Atlantic Butterfish 8
Biology and Distribution 8
Description of the Fishery 8
Status of the Stock and Quota Recommendations for Butterfish 9
Atlantic Mackerel 10
Biology and Distribution 10
Description of the Fishery 10
Commercial Fishery 10
Recreational Fishery 11
Status of the Stock 11
Current Market Overview for Mackerel 12
Criteria for Review 12
Major Producers of Atlantic Mackerel 13
Major Exporters of Mackerel 13
Major Importers of Mackerel 14
Key Events in the World Mackerel Market 14
The Current World Market for Mackerel 14
Future Supplies of Mackerel 15
US Production and Exports of Mackerel 15
Trade Barriers 16
Processor Survey Results for Mackerel 17
Costs and Benefits of JVs and TALFF 17
Benefits of Foreign Involvement 17
Costs of Foreign Involvement 18
Conclusions 19
Recommendations for Atlantic Mackerel 19
Literature Cited 22

ENVIRONMENTAL ASSESSMENT FOR THE 2000 CATCH SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH 26
Introduction 26
1.0 Proposed Action 26
2.0 Management Objectives 26
3.0 Atlantic Mackerel 26

3.1 Description of the Fishery . . . 27
3.2 Status of the stock (Report of the Twentieth Northeast Regional Stock Assessment Workshop) . . . 28
3.3 Ecology of the Stock . . . 29
3.3.1 Prey and Predator Relationships . . . 29
3.3.2 Relationship between Atlantic sea herring and Atlantic mackerel . . . 29
4.0 Economic and Social Environment . . . 29
4.1 Commercial Fishery . . . 30
4.1.1 Current Market Overview for Mackerel . . . 30
4.1.2 Criteria for Review . . . 30
4.1.3 Major Producers of Atlantic Mackerel . . . 31
4.1.4 Major Exporters of Mackerel . . . 31
4.1.5 Major Importers of Mackerel . . . 31
4.1.6 Key Events in the World Mackerel Market . . . 32
4.1.7 The Current World Market for Mackerel . . . 32
4.1.8 Future Supplies of Mackerel . . . 33
4.1.9 US Production and Exports of Mackerel . . . 33
4.1.10 Trade Barriers . . . 34
4.1.11 Processor Survey Results for Mackerel . . . 35
4.1.12 Costs and Benefits of JVs and TALFF . . . 35
4.1.13 Benefits of Foreign Involvement . . . 35
4.1.14 Costs of Foreign Involvement . . . 36
4.1.15 Domestic Market . . . 37
4.1.16 Joint Venture Market . . . 37
4.1.17 Recreational Fishery . . . 37
5.0 Alternative Actions . . . 37
5.1 Maintain 1999 specifications for 2000 . . . 37
5.2 Specify ABC at long term potential catch . . . 38
5.3 Specify JVP at 0 mt . . . 38
6.0 Impacts of the proposed action on the environment . . . 39
6.1 Impact of the IOY . . . 39
6.2 Impacts of TALFF . . . 39
6.3 Impacts of JVP . . . 39
7.0 Impacts of Alternative Actions . . . 39
7.1 Maintain 1999 Specifications in 2000 . . . 40
7.2 Specify ABC for Atlantic Mackerel at LTPC . . . 40
7.3 Specification of Zero JVP . . . 40
8.0 Atlantic Squids and Butterfish . . . 40
8.1 Atlantic Squid . . . 41
8.1.1 Description of the Fisheries . . . 41
8.2 Status of the Stocks . . . 41
8.3 Ecology of the stocks . . . 43
8.3.1 Prey and Predator Relationships . . . 43
8.4 Economic and Social Environment . . . 43
8.5 Other Management Actions: Adjustment of Minimum Mesh Language for Loligo 43
8.6 Alternative Actions . . . 44
8.6.1 Impacts of the proposed action on the environment . . . 44
8.6.2 Impact of the IOY . . . 44
8.6.3 Impact of Other Management Actions: Adjustment of Minimum Mesh Language for

Loligo . . . 44
8.7 Impacts of the Alternative Actions . . . 44
8.7.1 For Loligo, MAX OY of 26,000 mt and ABC, IOY, DAH, DAP of 11,700 mt 44
8.7.2 For Illex, 30,000 MT of ABC, IOY, DAH, DAP . . . 45
9.0 Butterfish . . . 46
9.1 Description of the Fisheries . . . 46
9.2 Status of the Stocks . . . 46
9.3 Alternative Actions . . . 47
9.4 Impacts of the proposed action on the environment . . . 47
9.5 Impacts of the alternative actions on the environment . . . 47
9.5.1 Specify DAH and OY at MAX OY (16,000 mt) . . . 47
9.5.2 Specify DAH and OY at 10,000 mt (1995 specification) . . . 47
10.0 Effect on endangered and marine mammals . . . 47
11.0 Essential Fish Habitat Assessment . . . 48
12.0 Finding of no significant impact . . . 48

REGULATORY IMPACT REVIEW FOR THE 2000 CATCH SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH (REVISED 11/10/99) . . . 49
1. INTRODUCTION . . . 49
1.1. Description of User Groups . . . 49
Chatham, Massachusetts . . . 49
New Bedford, Massachusetts . . . 49
Newport, Rhode Island . . . 50
Other Washington County Communities, RI (including Quonset Point) . . . 50
Point Judith, RI . . . 51
Stonington, Connecticut . . . 52
Freeport/Brooklyn area, NY . . . 52
Belford, Point Pleasant, and Barnegat Light, New Jersey . . . 53
Belford, NJ . . . 53
Point Pleasant, NJ . . . 53
Barnegat Light/Long Beach Island, NJ . . . 54
Cape May, NJ . . . 54
Atlantic City, NJ . . . 55
Shark River, NJ . . . 55
Highlands & Atlantic Highlands, NJ . . . 55
Port Norris & other Cumberland County ports, NJ . . . 56
Ocean City, Maryland . . . 56
Hampton Roads/Hampton, Virginia . . . 56
Wanchese, North Carolina . . . 57
1.2. Management Objectives . . . 57
2. METHODOLOGY AND FRAMEWORK FOR ANALYSIS . . . 57
3. IMPACTS OF PROPOSED ALTERNATIVES . . . 58
3.1. Proposed Action . . . 58
3.1.1. Atlantic Mackerel . . . 58
3.1.2. Atlantic Squids and Butterfish . . . 59
3.1.2.1 Other Management Actions: Adjustment of Minimum Mesh Requirement Language for Loligo . . . 60
3.2. Alternatives to the Proposed Action . . . 60

3.2.1 Alternatives to the Proposed Action for Atlantic mackerel in 2000 60
3.2.1.1 Maintain the 1999 quota specifications for Atlantic mackerel in 2000 . 60
3.2.1.2 Specify ABC for Atlantic mackerel at long term potential catch 60
3.2.1.3 Specify JVP at 0 mt for Atlantic mackerel 61
3.2.2 Alternatives to the Proposed Action for *Loligo* in 2000 61
3.2.2.1 For *Loligo* specify Max OY at 26,000 mt and ABC, IOY, DAH and DAP at 11,700 mt 61
3.2.3 Alternatives to the Proposed Action for *Illex* in 2000 61
3.2.3.1 For *Illex* specify Max OY, ABC, IOY, DAH, DAP at 30,000 mt 61
3.2.4 Alternatives to the Proposed Action for butterfish in 2000 61
3.2.4.1 Specify DAH and OY at MAX OY (16,000 mt) 61
3.2.4.2 Specify DAH and OY at 10,000 mt (1995 specification) 62
4. DETERMINATIONS OF A SIGNIFICANT REGULATORY ACTION 62
5. REVIEW OF IMPACTS RELATIVE TO THE REGULATORY FLEXIBILITY ACT . . . 62
5.1. Introduction 62
5.2. Determination of Significant Economic Impact on a Substantial Number of Small Entities 62
5.3. Analysis of Economic Impacts 63
5.3.1 Proposed Management Measures 63
5.3.2 Alternative Management Measures 65
5.3.2.1 Atlantic mackerel 65
5.3.2.1 Loligo and Illex squid 66
5.3.2.2 Alternatives to the Proposed Action for *Loligo* in 2000 66
5.3.2.3 Alternatives to the Proposed Action for *Illex* in 2000 67
5.3.2.3.1 For *Illex* specify Max OY, ABC, IOY, DAH, DAP at 30,000 mt . . . 67
5.3.2.4 Alternatives to the Proposed Action for butterfish in 2000 67
5.3.2.4.1. Specify DAH and OY at MAX OY (16,000 mt) 67
5.3.2.4.2 Specify DAH and OY at 10,000 mt (1995 specification) 67
5.4. Explanation of Why The Action is Being Considered 67
5.5. Objectives and Legal Basis for the Rule 67
5.6. Demographic Analysis 68
5.7. Cost Analysis 68
5.8. Competitive Effects Analysis 68
5.9. Identification of Overlapping Regulations 68
5.10. Conclusions 68
6. PAPER WORK REDUCTION ACT OF 1995 68
7. IMPACTS OF THE PLAN RELATIVE TO FEDERALISM 68

APPENDIX 77
1996 ECONOMIC ANALYSES FOR ATLANTIC MACKEREL SPECIFICATIONS 77
Council Benefit-Cost Analysis for Zero TALFF 77
Benefit Cost Analyses of Other Alternatives 81

EXECUTIVE SUMMARY

Table 1. Quota Recommendations for 2000 (mt)

	Loligo	*Illex*	Butterfish
Maximum OY - (Max. Optimum Yield)	26,000	24,000	16,000
ABC - (Allowable Biological Catch)	13,000	24,000	7,200
OY - (Optimum Yield)	13,000	24,000	5,900
DAH - (Domestic Annual Harvest)	13,000	24,000	5,900

	Mackerel
ABC - (Allowable Biological Catch)	347,000
IOY - (Initial Optimum Yield)	75,000
DAH - (Domestic Annual Harvest)	75,000
DAP - (Domestic Annual Processing)	50,000
JVP[1] - (Joint Venture Processing)	10,000
TALFF - (Total All. Lev. Foreign Fishing)	0

Note: DAH for Atlantic mackerel includes 15,000 mt recreational allocation (based on Amendment 5) + 50,000 DAP + 5,000 JVP.

[1] The specifications for IOY, DAH and JVP may increased up to 5,000 mt each at the discretion of the Regional Administrator without further consultation with the Council.

Recommended Special Conditions are:

1. Joint ventures are allowed south of 37^{o} 30' N. latitude, but the river herring bycatch south of that latitude may not exceed 0.25% of the over the side transfers of Atlantic mackerel.

2. The Regional Administrator should do everything within his/her power to reduce impacts on marine mammals in prosecuting the Atlantic mackerel fisheries.

3. The mackerel OY may be increased during the year, but the total should not exceed 347,000 mt.

4. Applications from a particular nation for a mackerel joint venture in 2000 will not be decided until the Regional Administrator determines, based on an evaluation of performances, that the nation's purchase obligations for previous years have been fulfilled.

Introduction

The Mid-Atlantic Fishery Management Council (MAFMC) initiated the development of the Atlantic mackerel and *Loligo* and *Illex* squid Fishery Management Plans in March of 1977. Both the mackerel and squid FMP's were adopted by the Council in March 1978 and were subsequently approved by the NMFS in July of 1979. The Atlantic butterfish FMP was submitted to NMFS in December 1978 and a revised version was approved by NMFS in November 1979.

The MAFMC began work to merge the mackerel, squid, and butterfish Plans into a single FMP in 1980. The Atlantic mackerel, *Loligo* and *Illex* squid, and Atlantic butterfish Fishery Management Plan was implemented by emergency interim regulation on 1 April 1983. Since then the FMP has been amended five times. Amendment 1 was prepared to implement the squid optimum yield mechanism, and revised the mackerel mortality rate. Amendment 2 changed the fishing year to the calendar year, revised the squid bycatch TALFF allowances, put the four species on a framework basis, and changed the fishing vessel permit from permanent to annual. Amendment 4 established definitions of overfishing for all four species.

This species complex was heavily exploited by foreign fleets during the 1960's and 1970's. With the advent of passage of the Magnuson Act in 1976 and the subsequent development of the Atlantic mackerel, Squid, and Butterfish FMP and it's amendments described above, the MAFMC has worked towards the sound management of the resource. One of the primary goals of the FMP was to "Americanize" these fisheries by maximizing opportunities for growth and by promoting the development of the U.S. mackerel, squid, and butterfish fisheries. As a result, foreign fisheries for the squids and butterfish have been eliminated.

Amendment 5 was approved by NMFS 9 February 1996. It lowered the *Loligo* MSY, eliminated the possibility of directed foreign fisheries for *Loligo*, *Illex*, and butterfish; instituted a dealer and vessel reporting system; instituted an operator permitting system; and expanded the management unit to include all Atlantic mackerel, *Loligo*, *Illex*, and butterfish under US jurisdiction. Three measures were disapproved: the proposed cap on ABC at long-term potential yield, the moratorium on entry to the *Illex* fishery, and the *Loligo* mesh exemption for the sea herring fishery. The Council chose to resubmit alternative management measures for the specification of ABC for Atlantic mackerel and qualifying criteria for an *Illex* moratorium permit which were subsequently approved by NOAA. The Council developed Amendment 6 which revised the definitions of overfishing for the squids and butterfish in recognition of the short life span of these species. Amendment 7 was developed to make the Atlantic mackerel, Squid, and Butterfish FMP consistent with other Northeastern FMP’s with respect to vessel upgrade and replacement criteria. Amendment 8 was developed to bring the Atlantic mackerel, Squid, and Butterfish FMP into compliance with the Sustainable Fisheries Act. The purpose of this document is to examine the biology, fisheries, and current stock status for this species complex and to specify the quotas and management recommendations for 2000 pursuant to the current FMP and Amendments.

Goals and Objectives of Current FMP

The current objectives of the FMP are :

1. Enhance the probability of successful (i.e., the historical average) recruitment to the fisheries.
2. Promote the growth of the U.S. commercial fishery, including the fishery for export.
3. Provide the greatest degree of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this FMP.
4. Provide marine recreational fishing opportunities, recognizing the contribution of recreational fishing to the national economy.
5. Increase the understanding of the conditions of the stocks and fisheries.
6. Minimize harvesting conflicts among US commercial, US recreational and foreign fishermen.

Management Unit

The current management unit is all Atlantic mackerel, *Loligo pealei*, *Illex illecebrosus*, and butterfish under US jurisdiction.

Loligo pealei

Biology and Distribution

Long-finned squid (*Loligo pealei*), also known as the common, bone or winter squid, are distributed in continental shelf and slope waters of the Western Atlantic Ocean from Newfoundland, Canada to the Gulf of Venezuela (Summers, 1983; Dawe et al. 1990). *Loligo* undergo seasonal migrations moving to shallow inshore waters in spring and summer to spawn and feed. In late autumn they move offshore to overwinter along the edge of the continental shelf (Summers, 1969; Serchuk and Rathjen, 1974).

Previous studies of the life history and population dynamics of this species assumed that *Loligo* died after spawning at an age of 18-36 months based on the analysis of length frequency data (which suggested a "crossover" life cycle (Mesnil 1977; Lange and Sissenwine 1980). However, recent advances in the aging of squid have been made utilizing counts of daily statolith growth increments (Dawe et al. 1985; Jackson and Choat 1992). Preliminary statolith ageing of *Loligo* indicated a life span of less than one year (Macy 1992). Consequently, the last two stock assessments for *Loligo* were conducted assuming that the species has an annual life-cycle and has the capacity to spawn throughout the year (NMFS 1994a, NMFS 1996), as now appears typical of pelagic squid species studied throughout the world (Jereb *et al.* 1991).

Fishery Description

United States fishermen have been landing squid along the Northeastern coast of the US since the 1880's (Kolator and Long 1978). The early domestic fishery utilized fish traps and otter trawls but was of relatively minor importance to the US fishery due to low market demand. The squid taken were used primarily for bait (Lux et al. 1974). However, squid have long been a popular foodfish in various foreign markets and therefore a target of the foreign fishing fleets throughout the world, including both coasts of North America (Okutani 1977). USSR vessels first reported incidental catches of squid off the Northeastern coast of the United States in 1964. Fishing effort directed at the squids began in 1968 by USSR and Japanese vessels. By 1972, Spain, Portugal and Poland had also entered the fishery. Reported foreign landings of *Loligo* increased from 2000 mt in 1964 to a peak of 36,500 mt in 1973. Foreign *Loligo* landings averaged 29,000 mt for the period 1972-1975.

Foreign fishing for *Loligo* began to be regulated with the advent of extended fishery jurisdiction in the US in 1977. Initially, US regulations restricted foreign vessels fishing for squid (and other species) to certain areas and times (the so-called foreign fishing "windows"), primarily to reduce spatial conflicts with domestic fixed gear fishermen and minimize bycatch of non-target species. The result of these restrictions was an immediate reduction in the foreign catch of *Loligo* from 21,000 mt in 1976 to 9,355 mt in 1978.

By 1982, foreign *Loligo* catches had again risen above 20,000 mt. At this time, US management of the squid resources focused on the Americanization of these fisheries. This process began with the development of joint ventures between US fishermen and foreign concerns. Domestic annual harvest (DAH) was increased from 7,000 mt in the 1982-83 fishing year to 22,000 mt for 1983-84. Foreign allocations were reduced from 20,350 mt during 1982-83 to 5,550 mt during 1983-84 (Lange 1985). The foreign catch of *Loligo* fell below 5,000 mt by 1986, to 2 mt in 1987 and finally to zero in 1990.

The development and expansion of the US squid fishery was slow to occur for several reasons. First, the domestic market demand for squid in the US has traditionally been limited to the bait market. Secondly, the US fishing industry lacked both the catching and processing technology necessary to exploit squid in offshore waters. In the late 19th and early 20th century, squid were taken primarily by pound nets. Even though bottom otter trawls eventually replaced pound nets as the primary gear used to capture squid during this century, the US industry did not develop the appropriate technology to catch and process squid in deep water until the 1980's.

The annual US domestic squid landings (including *Illex* landings) from Maine to North Carolina averaged roughly 2,000 mt from 1928-1967 (NMFS 1994a). During the period 1965-1980, US *Loligo* landings ranged from roughly 1,000 mt in 1968 to 4,000 mt in 1980. The US *Loligo* fishery began to increase dramatically beginning in 1983 when reported landings exceeded 15,000 mt. Since the cessation of directed foreign fishing in 1987, the US domestic harvest of *Loligo* averaged 17,800 mt during 1987-1992. The ex-vessel value of US caught *Loligo* increased from 7.8 million dollars in 1983 to 23.3 million in 1992.

In 1992 *Loligo* landings totaled 18,172 mt, 99% of which was taken by otter trawls. Nearly half of the 1992 harvest (8,112 mt) was take from statistical area 616, while six statistical areas (616, 537, 613, 622, 612, and 526) accounted for 87% of the total landings. Seasonally, 81% of the 1992 *Loligo* landings occurred in winter and autumn (Jan-Apr and Oct-Dec)(NMFS 1994a). Total US *Loligo* landings were 22,469 mt in 1993 valued at $29.1 million ($0.59/lb; $762/mt). NMFS data for 1994 indicate that US *Loligo* landings were 22,577 mt valued at $31.9 million. Unpublished NMFS weighout data indicate that *Loligo* landings declined to 17,928 mt in 1995 (dockside value declined to $23.0 million) and increased slightly to 18,008 mt (dockside value of $23.1 million) in 1995. NMFS weighout data indicate that 1996 US *Loligo* landings decreased to 12,459 mt (valued at $18.6 million) and then increased to 16,203 mt in 1997 (valued at $26.5 million). The most recent assessment (NMFS 1999) indicated that landings of

Loligo were 18,385 mt in 1998 valued at $32.2 million.

Status of the Stock Relative to Overfishing Definition and Quota Recommendations for *Loligo*

Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management (FMP) was developed to bring the FMP into compliance with the Sustainable Fisheries Act (SFA). The SFA, which reauthorized and amended the Magnuson-Stevens Act, made a number of changes to the existing National Standards, as well as to definitions and other provisions in the Magnuson-Stevens Act, that caused the Guidelines to be significantly revised. The most significant changes were made to National Standard 1, which imposed new requirements concerning definitions of overfishing in fishery management plans. The overfishing definition for *Loligo* was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Loligo* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{max} is exceeded (F_{max} is a proxy for F_{msy}). When an estimate of F_{msy} becomes available, it will replace the current overfishing proxy of F_{max}. Annual quotas will be specified which correspond to a target fishing mortality rate. Target F is defined as 75% of the F_{msy} when biomass is greater than B_{msy}, and decreases linearly to zero 50% of B_{MSY}. Maximum OY is specified as the catch associated with a fishing mortality rate of F_{max}. In addition, the biomass target is specified to equal B_{MSY}.

The most recent assessment of the *Loligo* stock (SAW 29) concluded that the stock is approaching an overfished condition and that overfishing is occurring (NMFS 1999). A production model indicated that current biomass is less than B_{msy}, and near the biomass threshold of 50% B_{MSY}. There is high probability that fishing mortality exceeded F_{msy} in 1998. The average F from the winter fishery (October to March) over the last five years averaged 180% of F_{MSY}, and F from the summer fishery equaled F_{MSY}. However, the production model also indicates that the stock has the ability to quickly rebuild from low stock sizes. Length based analyses indicated that fully-recruited fishing mortality is greater than F_{max} and stock biomass is among the lowest in the assessment time series (1987-1998). Recent survey indices of recruitment are well below average.

The new requirements of the SFA requires the Council to take remedial action to rebuild the stock to a level which will produce MSY (B_{msy}) given the status determination that *Loligo* is approaching an overfished state. The control rule in Amendment 8 specifies that the target fishing mortality rate must be reduced to zero if biomass falls below 50% of B_{msy}. The target fishing mortality rate increases linearly to 75% of F_{msy} as biomass increases to B_{msy}. However, projections made in SAW 29 indicate that the control rule appears to be overly conservative. Projections from SAW 29 indicate that the *Loligo* biomass can be rebuilt to levels approximating B_{msy} in three years if fishing mortality is reduced to the target mortality rate specified in Amendment 8 of 75% of F_{msy}. The yield associated with this fishing mortality rate (75% of F_{msy}) in 2000, assuming status quo F in 1999, was estimated to be 11,732 mt in SAW 29. The current regulations still specify Max OY as the yield associated F_{max} or 26,000 mt. In determining the specification of ABC for the year 2000, the Council considered advice offered by SAW 29 which indicated that the control rule adopted in Amendment 8 was too conservative. Model projections presented in the most recent assessment demonstrated that the stock could be rebuilt in a relatively short period of, even at fishing mortality rates approaching F_{msy}. Based on the SAW 29 projections, the Council chose to specify ABC as the yield associated with 90% F_{msy} or 13,000 mt.

Management advice from SAW 29 made special note of the fact that yield from this fishery should be distributed throughout the fishing year. Given that the current permitted fleet historically has demonstrated the ability to land *Loligo* in excess of the quota specified for 2000, the Council recommends that the annual quota be sub-divided into three quota period or trimesters. The quota will be allocated to each period based on the proportion of landings occurring in each trimester from 1994-1998. Based on the seasonal distribution of landings during this time period, the quota for January-April is 5,460 mt (42% of the total), the quota for May-August is 2,340 mt (18% of the total), and the quota for September-December is 5200 mt (40% of the total). The directed fishery during the first two trimester periods would be closed when 90% of the amount allocated to the period was landed and then a trip limit of 2,500 pounds will remain in effect until the quota period ends. Any underages from trimesters one and two will be applied to the next trimester and overages will be deducted from trimester three. The directed fishery will be closed in the third trimester when 95% of the annual quota has been taken. The intent of the Council is for the fishery to operate at the 2,500 trip limit level for the remainder of the third quota period.

The 2000 specification of ABC for *Loligo* should have a positive impact on other fisheries. The commercial fishery for *Loligo* is primarily prosecuted with otter trawls and often harvests a mixed fishery, including *Loligo* squid, scup, black sea bass, summer flounder, Atlantic mackerel and silver hake. Given the mixed species nature of the *Loligo* fishery, incidental catch of other species does occur. Because these measures would result in a reduction of effort in the *Loligo* fishery, the incidental catch of other species should also decrease. For example, the proposed reduction in the *Loligo* quota for 2000 should also result in a reduction in scup discards. Assuming that effort in the directed *Loligo* fishery is reduced in direct proportion to the projected reduction in landings and a uniform ratio of discards to landings occurred over the year, a 28% reduction in Loligo quota should equate to a 28% reduction in scup discards.

Table 2. Summary of specifications and landings for *Loligo* (mt).

	1996	1997	1998	1999	2000
Max OY	44,000	36,000[1]	26,000	26,000	26,000
ABC	30,000	21,000	21,000	21,000	13,000
IOY	25,000	21,000	21,000	21,000	13,000
DAH	25,000	21,000	21,000	21,000	13,000
DAP	25,000	21,000	21,000	21,000	13,000
JVP	0	0	0	0	0
TALFF	0	0	0	0	0
Landings (mt)	12,026	16,308	18,385	11,004[2]	-
Value (millions $)	18.6	26.5	32.2	-	-

[1] 26,000 mt when overfishing threshold in Amendment 6 was approved.
[2] Preliminary landings as of September 11, 1999.

Other Management Measures for *Loligo*

In addition to the quota specifications summarized above, the Council also recommends additional language be added to the regulations pertaining to gear requirements in the *Loligo* fishery. Industry members testified that some fishermen may be rigging the inner portion of the codends used in the *Loligo* fishery in such a manner that alters the intended selective properties of the regulated mesh size by using an inner codend of substantially greater circumference than the outer portion of the codend (i.e., the strenghtener). The Council proposes to remedy this situation by adding the following language to the *Loligo* mesh restriction section of the regulations governing the *Loligo* fishery: “The inside webbing of the codend shall be the same circumference or less than the outside webbing (strenghtener). In addition, the inside webbing shall not be more than two feet longer than the outside webbing”. The addition of this language should greatly improve enforcement of the mesh requirements in the *Loligo* fishery.

Illex illecebrosus

Biology and Distribution

The short-finned or summer squid, *Illex illecebrosus*, is a neritic squid of the Northwest Atlantic Ocean whose distribution extends from Newfoundland, Canada to Florida, USA. The species migrates seasonally, moving into shallow waters of New England to Newfoundland and onto the continental shelf of the Mid-Atlantic Bight during summer to feed. In late fall, *Illex* begin to move offshore and south to the edge of the continental shelf to spawn during winter (Dawe *et al.* 1981). The principal spawning area is believed to be south of Cape Hatteras over the Blake Plateau during December and January. During late winter and early spring larvae and juveniles are transported Northward by the Gulf Stream. In late spring, juveniles begin to move onto the shelf into shallow water.

The age and growth of *Illex* has been well studied relative to other squid species, being one of the few for which the statolith ageing method has been validated (Dawe *et al.* 1985). Research on the age and growth of *Illex* based on counts of daily statolith growth increments indicates an annual life span (Dawe *et al.* 1985).

Description of the Fishery

As in the case of *Loligo*, *Illex* have been exploited by US fishermen since at least late 1800's, being used primarily as bait. From 1928 to 1967, reported annual US squid landings from Maine to North Carolina (including *Loligo pealei*) ranged from 500-2,000 mt (Lange and Sissenwine 1980). However, foreign fishing fleets became interested in exploitation of the neritic squid stocks of the Northwest Atlantic Ocean when the USSR first reported squid bycatches in the mid-1960's. By 1972, foreign fishing fleets reported landing 17,200 thousand mt of *Illex* from Cape Hatteras to the Gulf of Maine. During the period 1973-1982, foreign landings of *Illex* in US waters averaged about 18,000 mt, while US fisherman averaged only slightly more than 1,100 mt per year. Foreign landings from 1983-1986 were part of the US joint venture fishery which ended in 1987 (NMFS 1994a). The domestic fishery for *Illex* increased steadily during the 1980's as foreign fishing was eliminated in the US EEZ. US landings first exceeded 10,000 mt in 1987 and ranged roughly from 11,000 mt in 1990 to 17,800 mt in 1992.

Because their geographical range extends well beyond the US EEZ, *Illex* are subject to heavy exploitation in waters outside of US jurisdiction. During the mid-1970's, a large directed fishery for *Illex* developed in NAFO subareas 2-4. Reported landings of *Illex* increased dramatically from 17,700 mt in 1975 to 162,000 mt in 1979. *Illex* landings in NAFO subareas 2-4 subsequently plummeted to slightly less than 13,000 mt by 1982. Hence, within the total stock of *Illex* (NAFO Subareas 2-6) landings peaked in 1979 at 180,000 mt but have since declined sharply, ranging from 2,800 to 22,200 mt during the period 1983-1991 (NMFS 1994a).

In 1992, US *Illex* landings were a then record high 17,827 mt with an ex-vessel value of $9,700,000 (average price=$0.54 per kg/$0.25 per lb). Statistical area 622 accounted for 63% of the total harvest, while three areas (SA 622,626, and 632) accounted for 96% of the total in 1992. Temporally, 94% of the 1992 *Illex* landings were taken during June through October. Otter trawl gear accounted for virtually all (99.9%) of the 1992 landings (NMFS 1994a).

Illex landings reached 18,012 mt in 1993 and then rose slightly to a record high 18,344 mt in 1994. In 1993 prices fell to $473/mt but rose sharply in 1994 to $569/mt. NMFS weighout data indicate that Illex landings declined to 14,049 mt in 1995 (dockside value declined to $8.0 million). NMFS weighout data indicate that 1996 US *Illex* landings increased to 16,969 mt (valued at $9.7 million) and then declined to 13,632 mt (valued at $6.1 million) in 1997. The most recent assessment (NMFS 1999) indicated that landings of *Illex* were 22,705 mt in 1998 valued at $9.2 million. *Illex* landings for the period 1994-1998 averaged 17,142 mt.

Status of the Stock and Quota Recommendations for *Illex*

Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management (FMP) was developed to bring the FMP into compliance with the Sustainable Fisheries Act (SFA). The SFA, which reauthorized and amended the Magnuson-Stevens Act, made a number of changes to the existing National Standards, as well as to definitions and other provisions in the Magnuson-Stevens Act, that caused the Guidelines to be significantly revised. The most significant changes were made to National Standard 1, which imposed new requirements concerning definitions of overfishing in fishery management plans. The overfishing definition for *Illex* was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Illex* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{MSY} is exceeded. Annual quotas will be specified which correspond to a target fishing mortality rate of 75% of F_{MSY}. Maximum OY will be specified as the catch associated with a fishing mortality rate of F_{MSY}. In addition, the biomass target is specified to equal B_{MSY}. The minimum biomass threshold is specified as ½ B_{MSY}.

The most recent assessment of the *Illex* stock (SAW 29) concluded that the stock is not in an overfished condition and that overfishing is not occurring (NMFS 1999). However, due to a lack of adequate data, an the estimate of yield at F_{msy} was not updated in SAW 29. However, an upper bound on annual fishing mortality was computed for the US EEZ portion of the stock based on a model which incorporated weekly landings and relative fishing effort and mean squid weights during 1994-1998. These estimates of F were well below the biological reference points. Current absolute stock size is unknown and no stock projections were done in SAW 29.

Since data limitations did not allow an update of yield estimates at the threshold and target fishing mortality rates, the Council recommends that the specification of MAX OY and ABC be specified at 24,000 mt (yield associated with F_{msy}). Under this option, the directed fishery for *Illex* would remain open until 95% of ABC is taken (22,800 mt). When 95% of ABC is taken, the directed fishery will be closed and a 5,000 pound trip limit will remain in effect for the remainder of the fishing year.

Another option would be to delay the start of the *Illex* fishing season which would allow for higher yields while maintaining the target fishing mortality rate (75% of F_{msy}). Analyses presented in SAW 29 indicate that delaying the opening of the *Illex* season until June 1 would allow for a quota specification (ABC) of 23,871 mt (4.7% increase). Delaying the opening of the *Illex* season until June 15 would allow for a quota specification of 25,969 mt (13.9% increase). Either of these options would not allow directed fishing for *Illex* to commence until at least June 1. Many of the vessels participating in the *Illex* fishery also participate in the directed fishery for *Loligo*. Given the quota reductions proposed for the *Loligo* fishery in 2000 and semi-annual allocation of the quota, it is likely that a closure of the *Loligo* fishery will be necessary during the first half of the fishing year. If the opening of the *Illex* season were delayed until June or later and the closure of the *Loligo* fishery occurs prior to that time, vessels which participate in both fisheries would have few, if any optional fisheries to participate in. Therefore, the Council recommends that the no season be specified for the 2000 annual *Illex* quota specifications. However, the

Council decided to initiate a framework action to consider seasons in the year 2000 and subsequent fishing years.

Table 3. Summary of specifications and landings for *Illex* (mt).

	1996	1997	1998	1999	2000
Max OY	30,000	30,000[1]	24,000	24,000	24,000
ABC	30,000	19,000	19,000	19,000[2]	24,000
IOY	21,000	19,000	19,000	19,000[2]	24,000
DAH	21,000	19,000	19,000	19,000[2]	24,000
DAP	21,000	19,000	19,000	19,000[2]	24,000
JVP	0	0	0	0	0
TALFF	0	0	0	0	0
Landings (mt)	16,969	13,632	22,706	6,404[3]	-
Value (millions $)	9.7	6.1	9.2	-	-

[1] 24,000 mt when overfishing threshold in Amendment 6 was approved.
[2] 22,800 mt when Amendment 8 was approved.
[3] Preliminary landings as of September 11, 1999.

Atlantic Butterfish

Biology and Distribution

Atlantic butterfish, *Peprilus triacanthus*, are distributed along the Atlantic coast of North America from Newfoundland to Florida (Bigelow and Schroeder 1953), and are found in commercially exploitable concentrations from Southern New England south to Cape Hatteras (Murawski and Waring 1979). Butterfish north of Cape Hatteras exhibit migratory patterns typical of temperate fishes of the Mid-Atlantic Bight. During the winter months, butterfish are found in deep waters (ca. 200 m) along the edge of the continental shelf. During late spring and summer, butterfish move inshore and northward. Butterfish begin to move offshore again as northern inshore waters begin to cool (Murawski and Waring 1979).

Butterfish are partially recruited to the spawning stock by the end of their first year, and essentially all individuals are mature by age two (Hildebrand and Schroeder 1928; Murawski *et al*. 1978). Spawning occurs from May-July in near shore coastal waters, with chief egg production in June. Growth of butterfish is rapid with a maximum size of 30 cm being achieved in six years, however few fish are observed which are greater than 20 cm or three years of age (Murawski and Waring 1977).

Description of the Fishery

Atlantic butterfish were landed exclusively by US fishermen from the late 1800's (when formal record keeping began) until 1962 (Murawski and Waring 1979). Reported landings averaged about 3,000 mt from 1920-1962 (Waring 1975). Beginning in 1963, vessels from Japan, Poland and the USSR began to exploit butterfish along the edge of the continental shelf during the late-autumn through early spring. Reported foreign catches of butterfish increased from 750 mt in 1965 to 15,000 mt in 1969, and then to about 18,000 mt in 1973. With the advent of extended jurisdiction in US waters, reported foreign landings declined sharply from 10,353 mt in 1976 to 1,326 mt in 1978. Foreign landings were slowly phased out by 1987. Since 1988, foreign butterfish landings have averaged about 1 mt.

During the period 1965-1976, US Atlantic butterfish landings averaged 2,051 mt. From 1977-1987, average US landings doubled to 5,252 mt, a historical peak of slightly less than 12,000 mt landed in 1984. Since then US landings have declined sharply to an average of 2,500 mt since 1988. Recent reductions in Japanese demand for butterfish has probably had a negative effect on butterfish landings.

Butterfish landings totaled 2,700 mt in 1992. Almost half (45%) of the 1992 total came from southern New England waters (Statistical area 53). Two statistical areas, 53 and 61, accounted for over 75% of the 1992 total. About half of the landings occurred during January and February, the remainder being distributed throughout the rest of the year. Butterfish landings were 3,631 mt and 2,013 mt in 1994 and 1995 , respectively. NMFS weighout data indicate that US butterfish landings increased to 3,489 mt in 1996 (valued at $5.1 million) and then decreased to 2,797 mt (valued at $4.7 million) in 1997. NMFS weighout data indicate that US butterfish landings were 1,964 mt in 1998 (valued at $2.5 million).

Status of the Stock and Quota Recommendations for Butterfish

The SAW 17 (NMFS 1994a) Advisory Report included the following concerning the state of the stock:

"The Atlantic butterfish stock is at a low to medium biomass level and current catch levels are below the MSY of 16,000, however, exploitation rate is unknown. Although recruitment of butterfish has remained high in recent years, the stock size of adults has declined since 1990 and is currently well below average. Since 1988, annual butterfish landings have averaged 2,500 mt, or only 25% of the domestic allowable harvest (DAH) of 10,000 mt. Landings in 1993 are projected to be 3,000 mt. Survey biomass indices in autumn 1992 and spring 1993 were among the lowest in the survey time series. Fishing effort increased in 1992 but, overall, has been relatively stable since 1984. Commercial landings per unit of effort (LPUE) in 1992 remained at the low levels observed since 1988."

SAW 17 (NMFS 1994a) offered the following management advice:

"Butterfish landings in recent years have been well below historical average yields. Japanese demand for butterfish has waned and this has had a negative impact on harvest levels. Butterfish landings are thus unlikely to increase unless market demand improves. If demand does improve, however, the stock in its current condition may not be able to sustain landings in excess of the long term historical average (1965-1992) of 7,200 mt because of recent declines in abundance as indicated by survey indices."

"Historical information suggests that discarding of butterfish may be an important source of fishing-induced mortality. The SARC recommends that data be collected that would allow discard levels to be reliably estimated."

"Given that butterfish is a short-lived species, new approaches to the assessment and management of the stock are required. A more adaptive, real-time assessment/management system will be needed to maintain full exploitation of the stock while simultaneously ensuring that adequate spawning stock levels are achieved. This would involve both real-time evaluation of stock status and in-season catch level adjustments."

No new assessment information is available. Based on the recommendations of SAW-17, ABC should not exceed 7,200 mt. In addition, the Council chose a risk averse approach by setting DAP and DAH at 5,900 mt. This level was chosen because considerable uncertainty exists about the level of discards in the directed fishery. The quota of 5,900 mt was set to allow for discards such that the ABC of 7,200 mt should not be exceeded. In addition, since TALFF for Atlantic mackerel is specified at zero there is no bycatch TALFF specification necessary for butterfish.

Table 4. Summary of specifications and landings for butterfish (mt).

	1996	1997	1998	1999	2000
Max OY	16,000	16,000	16,000	16,000	16,000
ABC	7,200	7,200	7,200	7,200	7,200
IOY	5,900	5,900	5,900	5,900	5,900
DAH	5,900	5,900	5,900	5,900	5,900
DAP	5,900	5,900	5,900	5,900	5,900
JVP	0	0	0	0	0
TALFF	0	0	0	0	0
Landings (mt)	3,489	2,798	1,964	-	-
Value (millions $)	5.1	4.7	2.5	-	-

Atlantic Mackerel

Biology and Distribution

Atlantic mackerel, *Scomber scombrus*, in the Northwest Atlantic are distributed from Labrador to North

Carolina. Sette (1950) first hypothesized the existence of two spawning components, a southern group which spawns primarily in the Mid-Atlantic Bight during April-May and a northern group which spawns in the Gulf of St. Lawrence in early summer. Both groups overwinter in shelf waters generally south of Georges Bank, with extensive seasonal migrations undertaken to and from spawning and summering grounds (north in spring, south in autumn). Even though there appears to be two spawning groups, both groups overwinter and are subject to fishing in the same vicinity (shelf waters south of Georges Bank). As a result, mackerel in the Northwest Atlantic have been considered a unit stock since 1975 (Anderson 1982).

All Atlantic mackerel are sexually mature by age 3, while about 50% of the age 2 fish are mature. Eggs are buoyant and incubate for about one week. Growth is very rapid with fish reaching 20 cm (7.9 in) by their first autumn (Anderson and Paciorkowski 1978). The maximum age observed is 17 years (Pentilla and Anderson 1976).

Description of the Fishery

Commercial Fishery

Atlantic mackerel have a long history of exploitation off the northeastern coast of the United States dating back to colonial times. American colonists of the 1600's considered mackerel one of their most important staple commodities (Hoy and Clark 1967). The principal commercial gear was the haul seine prior to 1800. Hook and line then became the primary gear until about 1850 when the purse seine was introduced and largely replaced the traditional hook and line method (Anderson and Paciorkowski 1978).

Formal record keeping for Atlantic mackerel in the US began in 1804. During 1804-1818, the US fishery was confined to near shore waters and annual landings averaged about 3,100 mt. Reported landings then increased sharply when the offshore salt mackerel fishery developed in 1818. As the market for salt mackerel grew, so did the fleet in both size and number of vessels. Within 20 years, more than 900 sailing vessels operated from US ports and landings subsequently reached a pre-1850 peak of 80,300 mt in 1831. Annual US landings averaged 41,700 mt from 1819 to 1885 but varied from 10,500 mt in 1840 to 81,300 in 1884. The Canadian mackerel fishery developed later than in the US, and although catch statistics were first reported in 1876, their fishery was probably significant since 1850. Combined US and Canadian

landings peaked in 1889 at 106,000 mt, but declined sharply to 13,300 mt by 1889 (Anderson and Paciorkowski 1978).

Landings remained low during the period 1886-1924, averaging 18,100 mt per year (9,400 mt US, 11,700 mt Canadian). The fishery changed significantly during this period as vessels changed from sail to motor power and market demand shifted from salted to fresh mackerel. Average landings subsequently increased to 35,200 mt (23,500 mt US, 11,700 mt Canadian) for the period 1925-1949 with the highest level of 49,200 mt in 1944. Landings gradually declined during the next decade, falling to 6,100 mt in 1959 (Hoy and Clark 1967; Anderson and Paciorkowski 1978).

The modern northwest Atlantic mackerel fishery underwent dramatic change with the arrival of the European distant-water fleets (DWF) in the early 1960's. While the first DWF landings reported in 1961 were not large (11,000 mt), they increased substantially to over 114,000 mt by 1969. Total international commercial landings (NAFO Subareas 2-6,) peaked at 437,000 mt in 1973 and then declined sharply to 77,000 by 1977 (Overholtz 1989).

The Magnuson Act of 1976 established control of the portion of the mackerel fishery occurring in US waters (NAFO Subareas 5-6) under the auspices of the Mid-Atlantic Fishery Management Council. Reported foreign landings in US waters declined from an unregulated level of 385,000 mt in 1972 to less than 400 mt from 1978-1980 under Magnuson (the foreign mackerel fishery was restricted by NOAA Foreign Fishing regulations to certain areas or "windows"). Under the control of MAFMC mackerel FMP and subsequent amendments, foreign mackerel catches were permitted to increase gradually to 15,000 mt in 1984 and then to a peak of almost 43,000 mt in 1988.

Recent US management policy of no TALFF combined with political and economic changes in Eastern Europe resulted in a decline in foreign landings from 9,000 mt in 1991 to 0 in 1992 and 1993. US commercial landings of mackerel increased steadily from roughly 3000 mt in the early 1980's to greater than 31,000 mt in 1990. However, US mackerel landings declined to 12,418 mt in 1992 and 4,666 mt in 1993. NMFS weighout data indicate that US landings were 8,543 mt in 1994 and 8,442 mt in 1995. NMFS weighout data indicate that US Atlantic mackerel landings increased to 15,712 mt in 1996 (valued at $4.6 million) and then declined slightly to 15,406 mt in 1997 (valued at $9.5 million). NMFS weighout data indicate that US Atlantic mackerel landings were 12,509 mt in 1998 (valued at $4.7 million).

Recreational Fishery

The Atlantic mackerel is seasonally important to the recreational fisheries of the Mid-Atlantic and New England regions. They are available to recreational anglers in the Mid-Atlantic primarily during the spring migration. Historically, mackerel first appear off Virginia in March and gradually move northward. Christensen *et al.* 1979 found mackerel to be available to the recreational fishery from Delaware to New York for about three weeks (generally from early April to early May). As a result, the annual recreational catch of mackerel appears to be sensitive to changes in their migration and subsequent distribution pattern (Overholtz *et al.* 1989).

Since 1979, recreational mackerel landings have varied from 284 mt in 1992 to 4,032 mt in 1987. In recent years, recreational mackerel landings have increased steadily from 1,249 mt in 1995 to 1,736 mt in 1997. NMFS recreational fisheries data indicate that recreational mackerel landings declined to 690 mt in 1998. Recreational mackerel landings occur from Virginia to Maine, with highest catches from New Jersey to Massachusetts. New Jersey accounted for 37% of the recreational mackerel landings for the period 1979-1991, followed by Massachusetts (25%) with the remaining States landing roughly equal amounts of Atlantic mackerel.

Status of the Stock

The Northwest Atlantic mackerel stock was recently assessed at SAW-20 (NMFS 1995). The assessment concluded that the Atlantic mackerel stock is currently at a high level of abundance and is under-exploited.

In 1994, F was estimated to be 0.02 with an 80% confidence interval of 0.00-0.03, while SSB was estimated to be 2.1 million mt (with an associated 80% confidence interval of 1.2 - 8.2 million mt).

A recent Canadian assessment confirmed the conclusion that the Atlantic mackerel stock is currently at a high level of abundance (Gregoire 1996). Results of spawning stock size projections based on egg production in Canadian waters indicated that the northern (i.e., Canadian) portion of the adult stock remained constant at around 800,000 mt between 1992 and 1994. The Canadian assessment concluded that Atlantic mackerel stock biomass remains high and further that the appearance of one and two year old fish (the 1993 and 1994 year classes) in the 1995 Canadian catch indicates that two very large year classes are entering the fishery.

Current Market Overview for Mackerel

According to the FAO, world landings of Atlantic mackerel have been on an increasing trend. In 1993, Atlantic mackerel world landings were estimated to be 841,000 mt. This represented a 7% increase from the 1992 landings (FAO 1993). Production of frozen mackerel (all species) increased from 1.2 million mt in 1994 to 1.4 million mt in 1996 (FAO 1996).

Mackerel had been reported to be in short supplies in major international markets prior to 1997 (FN 1995, ITN 1996 and 1996a, FAO 1996, and SFI 1996). Limited supplies have generated intense pressure in the European Union (EU) mackerel market (ITN 1996a). This situation appeared unchanged through 1997. Large quantities of mackerel have been purchased by East European countries like Poland Russia, and Latvia. These purchases have increased pressure on prices, while leaving fewer supplies for more traditional markets such as Japan (SFI 1996). Quota reductions in western mackerel grounds are creating additional market uncertainty. Present market conditions might be expected to cause larger traders to increase “sourcing” and prices are likely to stay high or increase further.

Canada and Jamaica continued to be the two most important markets for U.S. mackerel during the early to mid-1990's. Jamaica has been considered as one of the most steady and promising markets for US frozen mackerel. In 1995, the US exported 985 mt of frozen mackerel to Jamaica, this represented a 68% increase from 1994, and a 22% decrease from the 1991-1994 average. The frozen mackerel exported to Jamaica in 1995 was valued at $641/mt, this was the highest mackerel exported value to that country since 1993. In 1996, the US exported 1,830.3 mt of Atlantic mackerel to Jamaica at an average price of $820/mt. In 1995, Canada purchased 1,269 mt ($798/mt) of frozen mackerel from the US, this represented a 120% increase from 1994, and a 303% increased from the 1991-1994 average. The overall US export of fresh/chilled and frozen mackerel in 1995 was estimated at 3,296 mt, this represented a 12% increase from 1994, and a 22% decrease from the 1991-1994 average (Ross 1996). In 1996, the US exported 3501 mt of Atlantic mackerel to Canada.

Total US exports of Atlantic mackerel continued to increase in 1996 to 6137 mt valued at $5.3 million. Total US exports of all mackerel species was 17,367 mt valued at $14 million. Canada continued to be the largest importer of US fresh mackerel in 1998 (341 mt valued at $1.0 million). Japan was the largest importer of US frozen mackerel in 1998 (5,804 mt valued at $3.5 million) followed by Australia (2,917 mt/$1.7 million), Jamaica (1,742 mt/ $1.65 million), Canada (1,579 mt/$1.3 million), Hong Kong (1,005 mt/$1.1 million), Philippines (901 mt/$1.1 million), and Uruguay (839 mt/$ 0.7 million). US exporters placed an additional 139 mt of prepared/preserved mackerel products in foreign markets in 1998 valued at $0.2 million.

National Marine Fishery Service weighout data (Maine-Virginia), shows that the average exvessel prices for Atlantic mackerel in the US declined steadily from $400/mt ($0.18/lb) in 1989 to $281/mt ($0.13/lb) in 1994. Since then, however exvessel prices have moved upward from $296/mt ($0.13/lb) in 1994 to $321/mt ($0.15/lb) in 1995 (based on preliminary NMFS data). NMFS weighout data also show that US commercial landings of Atlantic mackerel have increased from 4,653 mt in 1993 to 8,438 mt in 1995. Preliminary NMFS data indicate that US Atlantic mackerel landings increased to 15,712 mt in 1996. Ex-

vessel prices for Atlantic mackerel declined slightly in 1996 to $296/mt ($0.13/lb) and then increased to $376/mt ($0.17/lb) in 1998.

Criteria for Review

The Management Plan for Atlantic Mackerel, Squid, and Butterfish Fisheries requires that specific evaluations be made in the quota setting process before harvest rights are granted to foreign interests in the form of TALFF or joint venture allocations. The nine criteria to be evaluated in the following sections are:

1. total world export potential by producing countries;
2. total world import demand by consuming countries;
3. US export potential based on expected US harvests, expected US consumption, relative prices, exchange rates, and foreign trade barriers;
4. increased/decreased revenues to the US from foreign fees;
5. increased/decreased revenues to US harvesters (with/without joint ventures);
6. increased/decreased revenues to US processors and exporters;
7. increases/decreases in US harvesting productivity due to decreases/increases in foreign harvest;
8. increases/decreases in US processing productivity; and
9. potential impact of increased/decreased TALFF on foreign purchases of US products and services and US caught fish, changes in trade barriers, technology transfer, and other considerations.

Major Producers of Atlantic Mackerel

World Atlantic mackerel landings were estimated at 841,445 mt in 1993, this represented a 7% increase from the 1992 landings (FAO 1993). Since then the world production of mackerel has declined. World Atlantic mackerel landings were estimated at 564,039 mt in 1996 (FAO 1996). The leading producers of Atlantic mackerel in 1993 were the United Kingdom, Norway, Ireland, Russian Federation, USSR, the Netherlands, and Denmark (FAO 1993):

Country	1993 Landings (mt)	1996 Landings (mt)
United Kingdom	253,058	144,964
Norway	223,838	136,446
Ireland	94,979	49,966
Russian Federation	46,716	43,046
USSR	44,140	-
Netherlands	42,532	24,246
Denmark	42,056	26,238
Others	94,126	139,133
Total	841,445	564,039

Major Exporters of Mackerel

According to FAO statistics, total global mackerel exports (all species of mackerel combined) in 1993 were estimated at 945,206 mt and valued at $454 million. This represented an increase in exports and value of 12% and 3.6% from 1992, respectively (FAO 1993a). Total global mackerel exports (all species of mackerel combined) in 1996 declined to 819,214 mt (a 13% decline compared to 1993). However, the total value of exports increased to $753 million. In 1993, major exporting countries of mackerel (fresh/frozen/chilled) include Norway, United Kingdom, Ireland, and the Netherlands (FAO 1993a). In 1996, Korea and the US exports of mackerel products exceeded that of the Netherlands (FAO 1996).

Country	1993 Exports (mt)	1996 Exports (mt)
Norway	293,854	216,257
United Kingdom	216,517	138,930
Ireland	161,772	126,229
Netherlands	104,777	48,768
Korea	10,329	60,242
USA	4,273	58,872
Other	153,684	169,916
Total	945,206	819,214

Major Importers of Mackerel

According to FAO statistics, global mackerel imports (fresh/frozen/chilled) in 1993 were estimated at 770,165 mt, and valued at $446 million. This represented an increase in imports and value of 12% and 6.6% from 1992, respectively (FAO 1993a). Major importing countries of mackerel (fresh/frozen/chilled) in 1996 included Japan, Philippines, Norway, Egypt, and the Russian Federation (FAO 1996):

Country	1993 Imports (mt)	1996 Imports (mt)
Japan	211,030	120,548
Nigeria	99,289	27,149
Norway	60,789	96,810
Netherlands	38,387	24,589
Poland	36,940	38,579
France	26,756	31,624
Côte d'Ivory	24,440	16,522
Russian Fed.	-	81,701
Egypt	15,819	82,478
Philippines	-	103,988
Thailand	15,038	41,873
Other	241,677	175,480
Total	770,165	923,819

Key Events in the World Mackerel Market

Much of what is important in the world market for mackerel revolves around events in a few key nations and markets. In the late 70's and early 80's Japan was the world's leading producer of mackerel (FAO 1982 and USITC 1993). Since then, Japan's mackerel landings have declined annually. In 1991 Japans' mackerel landings reached an estimated low of 255 thousand mt. Since then, landings have increased to 665 thousand mt in 1993, making Japan again a leading world producer (FAO 1993) -- still, this landing figure represents over a twofold decrease from the 1978 record landings by Japan. Japan is also the leading importer of mackerel. In 1993, Japan imported over 211 thousand mt of mackerel (27% of the world total). This represented a 50% increase in Japan's mackerel imports compared to 1992 (FAO 1993a).

Japan's strong yen, changes in global trade policies, and changes in internal market needs have made Japan a major fisheries importing country. Japan imported 3.3 million mt of fishery products valued at $17.89 billion in 1994. Imports of fish meal and valued added products have been on the increase in the last few years (ITN 1995).

In 1993, mackerel exports for Norway and the United Kingdom were over 54% of the world total (FAO 1993a). Norway has traditionally been an important supplier to the Japanese market. However, in 1995 the Norwegian mackerel catch in the North sea declined to 202 thousand mt, which represented a 22% decrease from the previous year. Recently, Norway has also exported large quantities of mackerel to Eastern European countries like Poland, Russia, and Latvia, leaving lower quantities to be exported to traditional markets such as Japan (SFI 1996). This event has contributed to recent price pressures for this commodity.

An important advantage that Norway and the United Kingdom have over the United States is the distinct characteristics that Atlantic mackerel from European waters has compared with the same species off the northeast coast of the US. European mackerel has a higher fat content than their North American counterparts, as well as reaching a larger average size and having a "blunter," deeper shape. All these characteristics appeal to the Japanese market and cause them to prefer European mackerel to our own (Ross 1994). Size is very important, 600+ gram fish command twice the price of smaller fish.

The Current World Market for Mackerel

Strong warnings were issued in 1996 by European scientists about the potential collapse of the European Atlantic mackerel stock. Large cuts in the total allowable catch (TAC) have been recommended to restore the spawning stock biomass to safe levels. While in recent years the TAC for this stock has remained high, European mackerel stocks are currently at the lowest level ever recorded (FN 1995a and FNI 1995).

As the fishing quota for the North sea mackerel was reduced for the 1996 season, canners were actively trying to execute existing orders. Reports surfaced that "processors in Denmark and Scotland may be interested in frozen mackerel from other sources if the price is competitive" (ITN 1996).

East European and Japanese buyers have been very active. This is likely to cause prices to remain high in the near future (ITN 1996a).

The Norwegian government relaxed buying controls for pelagic catches from October 15, 1995 to January 1, 1996 (FN 1995). Those buying controls -- imposed by the Norwegian fisheries department -- force all pelagic catches landed in Norway to be sold at auctions through *Norges Sildesalgslag* (the Norwegian sales organization). This prevents Norwegians processors from buying mackerel from foreign vessels until all the Norwegian quota is taken. Buying controls were relaxed following the 20% cut in the Norwegian mackerel quota, it was expected that this move would have helped processors to secure raw material to supply important markets.

Japanese cold storage of frozen mackerel (horse mackerel and chub mackerel) was 82,406 mt as of April 30, 1996, up 20% from a year earlier (ITN 1996b). Although cold storage of frozen mackerel is up in Japan, buyers in that market are still showing strong demand for European mackerel.

A new mackerel cannery began operations in Papua New Guinea under the management of Malaysia's Kumpulan Fima group. This facility is expected to produce 36,000 mt of canned mackerel per year, 4,000 more mt than is needed to supply the domestic demand. The surplus production will be exported (ITN 1995a). The cannery is expected to operate on domestic and imported fish (FAO 1995).

Future Supplies of Mackerel

Prospects for the European mackerel stock look poor. Europe's western mackerel (ICES areas VI & VII) TAC for 1996 was cut by 55% (FNI 1996). In addition, further reductions to the TAC were agreed for the 1997 fishing year. The 1996 reductions were far above the European scientific recommendations. According to European scientific recommendations, large cuts in mackerel TACs are needed in 1996 to restore the spawning stock biomass to a minimum biological threshold of 2.3 million mt by 1997-1998. That means that fishing mortality in 1996 would need to be reduced by 80% compared to 1994 in one year. In other words, to achieve this biological goal, the overall western mackerel TAC in 1996 should be reduced to 144 thousand mt compared with 762 thousand mt in 1994 (FNI 1995 and FN 1995a). In fact, the TAC's agreed upon for the European mackerel stocks decreased from 837,000 mt in 1994 to 645,000 mt in 1995 and finally to 452,000 mt in 1996. Actual landings exceeded the TAC specifications in 1994 and 1995 when European landings of Atlantic mackerel were 823,000 and 756,000 mt, respectively.

In Peru 40 medium size fishing vessels (490 to 750 cu. meters) are being built to fish for underutilized species (including mackerel) as that country's stocks of sardines and anchovies face increasing pressure (FNI 1995a). Steps are being taken in Chile by some fishing companies to establish mid-water trawling for jack mackerel. It is expected that this type of operation will have the capability to reach deeper waters, thus adding more flexibility to the existing efficient purse seining operations (FNI 1996a).

Namibia's horse mackerel stock looks very strong. Since its independence, that country has increased catches from about 300,000 mt to more than 400,000 mt (FNI 1995b). African markets have expanded at a very fast rate . Most of all horse mackerel is sold frozen in those markets (FNI 1995c).

US Production and Exports of Mackerel

NMFS weighout data showed that in 1995, Atlantic mackerel landings increased by 81% from the 1993 level. The average value of mackerel increased over 14% for the same period.

In 1991, landings peaked due to a relatively successful internal water processing venture between Russia and the state of New Jersey, and the one-year open door into the Japanese market. That year US producers were able to ship over more than 2,800 mt of frozen mackerel to Japan at an average value of $882/mt. The following year shipments fell to only 63 mt.

Overall, US exports of fresh/chilled and frozen mackerel in 1995 were estimated at 3,296 mt, this represented a 12% increase from 1994, and a 51% increase from 1993 (Ross 1996). In 1995, US producers were able to export 2,303 mt of frozen Atlantic mackerel valued at $1.7 million ($747/mt), and 992 mt of fresh/chilled mackerel valued at $1.5 million ($1,207/mt). US exports of Atlantic mackerel continued to increase in 1996 to 6,137 mt valued at $5.3 million. US exports of all mackerel species were 17,367 mt valued at $14.2 million in 1998.

The lack of mackerel in the North Sea area and the potential for future mackerel TAC reductions are providing opportunities for US producers to place additional exports of mackerel in the international market. Mackerel prices in the international market have increased in recent years which should help the US Atlantic mackerel industry in their attempt to sell large volumes of this product (Ross 1996). In 1995, the

US exported small quantities of Atlantic mackerel to non-traditional markets such as South Korea, Mexico, and Brazil. In 1996, US exporters placed Atlantic mackerel in Latvia, the Philippines, and South Africa.

Trade Barriers

Japan- has started to phase in tariff reductions on 219 fisheries items entering the country. These reductions have been approved through GATT negotiations. Mackerel is one of the major fishery products subject to tariff reduction (ITN 1995b). The tariff of frozen mackerel will be reduced from a 10% base rate to a new rate of 7%. This rate will be reduced over a 5 year period beginning in 1995. The stated base rate has already had the first tariff reduction taken out. The mackerel base rate in 1995 was 10% with 0.6% reduced each year for 5 years until the rate gets to 7%. This tariff rate reduction is not “bound”, therefore, rates may increase at some future date depending on market conditions in Japan (Ross 1995). The tariff for horse mackerel remain unchanged (ITN 1995b).

The Republic of Korea’s- National Fisheries Administration has announced the liberalization of fish imports for 1995-1997. Liberalization of the following mackerel products are expected (ITN 1994):

Date	Item
July 1, 1996	Mackerel (excluding livers and roes/frozen)
July 1, 1996	Mackerel (prepared/canned goods)
July 1, 1997	Mackerel (excluding livers and roes/fresh or chilled)

Korea has agreed to establish an import tariff rate of 10% on most fresh/frozen/dried seafood and 20% on prepared preserved food (Ross 1995).

The European Community- has a seasonal tariff on mackerel. During the EC peak season of June 16 - February 14, an unchanged 20% tariff is levied on foreign imports of mackerel (fresh/chilled fish excluding fillets). For fresh/chilled/frozen mackerel fillets and other mackerel meat there is a 15% year-round tariff (ITN 1994a and 1994b).

Taiwan- has requested membership in the World Trade Organization/GATT. US negotiators have been working to reduce existing Taiwanese barriers to various seafood products. In addition to significant reductions in key Taiwanese import tariffs, several Non-Tariff Measure (N.M.) which affect regional exporters are also to be reduced. At the present time, imports of squid, mackerel, sardines, herring, and catfish are not allowed into the country. The Taiwanese government has proposed to liberalize the NTM's over a 6-year phase-in period, except squid which will be liberalized in 1997 (Ross 1995).

Peoples Republic of China- is expected to drop import tariff rates once it becomes a member of GATT. The import tariff rate for frozen mackerel is expected to go from the base rate of 30% to the proposed rate of 15% (Ross 1995).

US- Has made concessions on 46 tariff lines. Canned mackerel is one of the major fishery products subject to tariff reduction, which has been reduced from 6 to 3% (ITN 1995c).

Processor Survey Results for Mackerel

Each year the Mid-Atlantic Council surveys East Coast processors to ascertain their expectations on current and future mackerel production. Totals are not directly comparable between years because the respondents (and their numbers) will differ from year to year.

Production estimates for Atlantic mackerel are as follows (mt):

Product/Market	1999 (15 Reporting)	2000 (7 Reporting)
US Food Market	5,280	1,900
US Bait Market	5,489	3,100
Foreign Export Market	27,466	21,400
TOTAL	38,235	26,400

Given the number of number of reporting units in 2000 these production estimates will likely increase due to the lower number of respondents. A number of the larger known processors failed to return the survey. One firm indicated that they were interested in establishing joint ventures for mackerel in the amount of 10,000 mt.

In order to more accurately assess processors' expectations, amounts expected to be processed in 1999 v. 2000 were compared for only those firms which provided estimates for both years. For these firms, projected needs increased 98% for 2000.

Costs and Benefits of JVs and TALFF

The presence of foreign fishing and processing vessels off US shores has long been a controversial matter, usually drawing strong opinions on both sides of the issue. The following sections attempt to highlight some of the benefits and costs of foreign involvement in the US mackerel fishery. A simple numerical calculation is not feasible, as most of the positive and negative aspects cannot be quantified.

Ultimately, a policy decision must be made as to which course of action is in the best interests of the US.

Benefits of Foreign Involvement

Providing an Additional Market Outlet - The greatest benefit which foreign nations can provide in return for their involvement is the purchase of US mackerel products, both shoreside and directly from US vessels. The conditions of these purchases have been the chief stumbling block in the past. Most foreign nations have stated that they cannot afford to bring their fleets over here and purchase US product without a substantial subsidy of TALFF. US fishermen have often held little interest in participating in joint ventures at the prices which foreign nations have been willing to pay for their mackerel harvests.

Fees - The US government charges a number of fees to foreign nations for the right to conduct fishing operations in US waters. The first is a permit fee of $354 per vessel, which is charged to all vessels whether they are taking directed (TALFF) harvests or simply making over-the-side JV purchases. The level of this fee has not changed in many years.

An additional "poundage fee" is charged for every ton of directed (TALFF) harvest made by the foreign nation. It is not charged on over-the-side JV purchases from US vessels. The fee is charged in advance in the sense that a letter of credit must be presented for the entire TALFF authorization before releases will be made to foreign vessels. The US government will draw down the letter of credit as foreign harvests are made.

The poundage fee will vary depending on the species for which TALFF is issued, and may change over time. In 1989 and 1990, the fee equaled $68.43 per metric ton for Atlantic mackerel, and was lowered to $58.33 in 1991, where it remains today. Using these values, the US government would have received the following revenues:

Year	TALFF	Revenue
1989	36,823	$2,520,000
1990	8,671	$593,000
1991	5,349	$312,000

Observers would be placed on any vessel which was involved in fishing or processing operations. Current observer fees would be on the order of $650 per day per observer, and are paid directly to the contracting firm utilized by the federal government.

Finally, NMFS charges an overhead fee of approximately $150 per day to cover the expenses of some of their personnel in overseeing foreign operations.

Technology Transfer - As occurred in the development of the US squid fishery, it is likely that transfer of information and experience can occur which would assist US firms in producing mackerel products for markets with which they are unfamiliar.

Assistance in Entering Foreign Markets - While it is not in the direct interest of the key mackerel exporting nations to assist the US in entering their markets, it is conceivable that an arrangement of mutual benefit could be worked out.

Assistance in Locating Stocks - While engaged in past joint ventures for mackerel, foreign partners have been of assistance to US catcher boats in locating schools.

Costs of Foreign Involvement

Opposition of US Industry - Perhaps the largest negative factor related to foreign involvement in the mackerel fishery is simply that much of the domestic industry is dead set against it. At public meetings where joint venture and TALFF issues are discussed, most industry spokesmen will agree that there is still

value in allowing US boats to make over-the-side sales of mackerel to foreign processing vessels, however they are vehemently opposed to any directed fishing of the foreign vessels themselves.

Filling US Markets - A long-standing charge which has been leveled against directed foreign fishing is that it displaces US harvests and sales. One known case in point is where a foreign vessel made directed harvests off the US and then proceeded down the coast to sell some of its catch in Jamaica, one of the few markets which the US has successfully entered.

The degree to which this has happened in the past or may occur in the future is debatable, however it is a fact that it is not in the best interests of the US to give away its national resources for free to the same nations could otherwise be purchasing them.

Lack of Reciprocal Access to Fishing Grounds - A telling point made by members of the US industry is that while European nations have requested the right to fish in US waters, there has been no corresponding invitation to the US industry to fish in their waters.

Administrative Concerns - While it is conceivable that the administration of foreign fishing ventures could someday evolve into an efficient and timely process, experiences to date have been problematic from an an administrative perspective. The highly contentious nature of these ventures has led to countless hours of debate at Council meetings, at a very high cost to both the government and public in the form of their time and travel expenses.

Concerns of Recreational Fishermen - US recreational fishermen have been vocal opponents of the operations of foreign vessels in the mackerel fishery. Many have blamed their activities for a drop in recreational mackerel harvests. While scientists have pointed to the effects of water temperature and the timing of migrations as the primary reasons for Mid-Atlantic anglers not finding mackerel available to them in recent years, their concerns have persisted.

Conclusions

In the absence of any compelling new proposals from foreign interests which might alter the current situation, it is the Council's position that TALFF be set to zero for the Atlantic mackerel fishery for 2000.

Recommendations for Atlantic Mackerel

Overfishing for Atlantic mackerel is defined to occur when the catch associated with a threshold fishing mortality rate of F_{msy} is exceeded. When SSB is greater than 890,000 mt, the overfishing limit is F_{MSY} (F=0.45), and the target F is the tenth bootstrap percentile of F_{MSY} (F=0.25). To avoid low levels of recruitment, the threshold F decreases linearly from 0.45 at 890,000 mt SSB to zero at 225,000 mt SSB (1/4 B_{MSY}), and the target F decreases linearly from 0.25 at 890,000 mt SSB to zero at 450,000 mt SSB (½ B_{MSY}). Annual quotas are be specified which correspond to a target fishing mortality rate according to this control law. The yield associated with the target fishing mortality rate of F=0.25 adopted in Amendment 8 is 369,000 mt. The ABC recommendation is 347,000 mt (F=0.25 yield estimate of 369,000 mt - the estimated Canadian catch of 22,000 mt).

The recreational mackerel catch allocation is 15,000 mt.

The processor survey response was 26,400 mt. It is recommended that this be increased to 50,000 mt because of non-responses to the survey.

Recommended special conditions are:

1. Joint ventures are allowed south of 37º 30' N. latitude, but the river herring bycatch south of that latitude may not exceed 0.25% of the over the side transfers of Atlantic mackerel.

2. The Regional Administrator do everything within his/her power to reduce impacts on marine mammals in prosecuting the Atlantic mackerel fisheries.

3. The mackerel OY may be increased during the year, but the total should not exceed 347,000 mt.

4. Applications from a particular nation for a mackerel joint venture in 2000 will not be decided until the Regional Administrator determines, based on an evaluation of performances, that the nation's purchase obligations for previous years have been fulfilled.

The Council recommended that initial JVP be specified at 10,000 mt and TALFF be specified at 0 mt for 2000 (the same as specified in 1999). The Council also endorsed a provision for an in-season increase in the JVP specification to a maximum JVP specification of 15,000 mt by the Regional Administrator should the need arise during the 2000 fishing season. This provision would give the Regional Administrator the discretion to increase the JVP specification by up to 5,000 mt without further consultation with the Council. The JVP specification (without an in-season adjustment) represents a decrease from 15,000 mt in 1998, 25,000 in 1997 and 35,000 mt in 1996. The Council had specified JVP at 35,000 mt or higher for several years prior to 1996. The 1997 and 1998-1999 specification JVP recommendations were reduced to reflect the concern that the Council has about the negative effect that JVP caught mackerel could have on further development of the US export market. The reduced production of mackerel in the North Sea area and the potential for future North Sea mackerel TAC reductions may provide an opportunity for US producers to place additional exports of mackerel in the international market. Mackerel prices in the international market are increasing, which should help the US Atlantic mackerel industry in their attempt to sell large volumes of this product. Recommendations for JVP any higher than those specified could impede US competitiveness in these expanding international markets. The Council intends to proceed on a policy course which recognizes the need for JV's in the short term to allow US harvesters to take mackerel at levels in excess of current US processing capacity. However, in the longer term the Council intends to eliminate JV's as US processing and export capacity increases.

The zero TALFF recommendation is based on the fact that mackerel caught by foreign vessels in US waters enters the world market in direct competition with mackerel harvested by US vessels. In 1992 and again in 1995, the Council conducted an analysis which concluded that specification of zero TALFF will yield positive benefits to the fishery and to the Nation (see Appendix). Subsequent analyses in more recent quota papers indicated that the conclusion about zero TALFF has not changed. Based on a review of the state of the world mackerel market and recent production levels, the Council again concluded that the specification of zero TALFF will yield positive benefits to the fishery and to the Nation.

If the projected recreational catch (15,000 mt), DAP (50,000 mt), and JVP (10,000 mt), are summed, the total is 75,000 mt, which is the recommended estimate of initial DAH. If the recommended 0 mt TALFF is
added to the DAH, the IOY would equal 75,000 mt. It is recommended that any increases to IOY during the year do not result in OY exceeding 347,000 mt. In summary:

Table 5. Summary of Specifications and Landings for Atlantic Mackerel (mt).

	1996	1997	1998	1999	2000
ABC	1,175,500	1,178,000	382,000	383,000[1]	347,000[1]
IOY	105,500	90,000	80,000	75,000	75,000
DAH	105,500	90,000	80,000	75,000[2]	75,000[2]
DAP	50,000	50,000	50,000	50,000	50,000
JVP	35,000	25,000	15,000	10,000	10,000[3]
TALFF	0	0	0	0	0
US Commercial	15,712	15,406	12,509	-	-
US Value(millions $)	4.6	9.5	4.7	-	-
US Recreational	1,416	1,736	690	-	-
Total US	17,128	17,142	13,199	-	-
Canadian	17,710	-	-	-	-

[1] ABC = 369,000 - 22,000 (F_{target} - Canadian).

[2] Includes recreational allocation of 15,000 mt.

[3] The specification for Joint Venture Processing may increased up to 15,000 mt at the discretion of the Regional Administrator without further consultation with the Council.

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ENVIRONMENTAL ASSESSMENT FOR THE 2000 CATCH
SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH

Introduction

This section is written in response to a need for analyses of the impacts of the 2000 specifications for the Atlantic mackerel, squid and butterfish (specifications) on the human environment. The Mid-Atlantic Fishery Management Council (Council) approved its 2000 recommendations for specifications at its August 1999 meeting and submitted the to the Regional Administrator, Northeast Region, National Marine Fisheries Service (Regional Administrator). A document titled "Annual Quota Specifications for Atlantic Mackerel, *Loligo*, *Illex*, and Butterfish for 2000" (quota paper was submitted to the Regional Administrator in September 1999. The quota paper not only serves as a vehicle for the Council's formal submission of recommendations for specifications, but also contains analyses upon which the recommendations are based.

1.0 <u>Proposed Action</u>

Regulations implementing the Fishery Management Plan for the Atlantic Mackerel, Squid, and Butterfish Fisheries (FMP) prepared by the Council appear at 50 CFR Part 648. These regulations stipulate that the Secretary will publish notice specifying the initial annual amounts of the initial optimum yield (IOY) as well as the amounts for allowable biological catch (ABC) domestic annual harvest (DAH), domestic annual processing (DAP), joint venture processing (JVP), and total allowable levels of foreign fishing (TALFF) for the species managed under the FMP. No reserves are permitted under the FMP for any of these species. Procedures for determining the initial annual amounts are found in §648.21. The term IOY is used in this fishery to reinforce the fact that the Regional Administrator may alter this specification up to the ABC if economic and social conditions warrant an increase. Therefore, this specification is no different than OY or optimum yield.

2.0 <u>Management Objectives</u>

The management objectives of the FMP remain unchanged and are as follows:

1. Enhance the probability of successful (i.e., the historical average) recruitment to the fisheries.

2. Promote the growth of the US commercial fishery, including the fishery for export.

3. Provide the greatest degree of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of the FMP.

4. Provide marine recreational fishing opportunities, recognizing the contribution of recreational fishing to the national economy.

5. Increase understanding of the conditions of the stocks and fisheries.

6. Minimize harvesting conflicts among US commercial, US recreational, and foreign fishing.

3.0 <u>Atlantic Mackerel</u>

The 2000 proposed initial specifications for Atlantic mackerel are contained in Table 1 below.

TABLE 1. FINAL INITIAL ANNUAL SPECIFICATIONS FOR ATLANTIC MACKEREL FOR THE FISHING YEAR JANUARY 1 THROUGH DECEMBER 31, 2000 (in metric tons (mt))

Max OY	N/A[1]
ABC	347,000
IOY	75,000
DAH	75,000[2]
DAP	50,000
JVP	10,000[3]
TALFF	0

[1] Not applicable; see the FMP.

[2] Contains 15,000 mt projected recreational catch based on the specifications contained in the regulations (50 CFR part 648).

[3] May be increased to 15,000 mt at the discretion of the Regional Administrator without further consultation with the Council.

3.1 Description of the Fishery

Atlantic mackerel (*Scomber scombrus*) is a fast swimming, pelagic, schooling species distributed in the Northwest Atlantic between Labrador and North Carolina. There are two major spawning components of this population, a southern group which spawns primarily in the Mid-Atlantic Bight during April-May, and a northern group which spawns the Gulf of St. Lawrence in June-July. Both groups spend the winter between Sable Island (off Nova Scotia) and Cap Hatteras in waters generally warmer than 7°C, with extensive northerly (spring) and southerly (autumn) migrations to and from spawning and summering grounds. Maximum observed size in recent years is about 47 cm or 18.5 inches (fork length) and 1.3 kg (3 pounds) in weight. Sexual maturity begins at age 2 and is usually complete by age 3. Maximum age is about 20 years.

The Atlantic mackerel fishery takes place over the Mid-Atlantic shelf region from Cape Hatteras to Southern New England. Vessels pursue the migrating fish up to Georges Bank. Smaller coastal fisheries work the stocks within the Gulf of Maine.

Atlantic mackerel are subjected to seasonal fisheries, both commercial and recreational, throughout most of their ranç U.S. commercial catches occur mainly during December-May in southern New England and Mid-Atlantic shelf waters. Foreign distant-water-fleets and joint venture efforts, wherein U.S. vessels unload to foreign fishing/processing vessel operate in the same areas and seasons. Mackerel fishing continues in coastal Gulf of Maine waters during May-December. Catches in Canadian waters off Nova Scotia and Newfoundland have typically been during May-Novemb

Atlantic mackerel is an important recreational caught species in both the Mid-Atlantic and New England Areas. They occur both offshore and inshore, and enter large estuaries, but most of the angling for them occurs along the ocean shore between the 13 and 60 meter contours. They are caught throughout the year, depending on the particular stretc of coast fished. Off Virginia, Maryland, and Delaware they are caught during late fall, winter, and early spring; off Nev Jersey, New York and southern New England during summer and early fall. Mackerel are caught during daylight hour by jigging, chumming, and trolling from boats, and by casting, jigging, and live-lining from shore.

3.2 Status of the stock (Report of the Twentieth Northeast Regional Stock Assessment Workshop)

The consensus of the Twentieth Northeast Regional Stock Assessment Workshop is that the stock of Atlantic mackere is currently under-exploited. Recruitment to the northwest Atlantic mackerel stock has been increasing in recent years Following a period of poor year classes from 1976 through 1980, there has been a series of years with relatively good recruitment with especially strong year classes in 1982, 1987, and 1988. These cohorts have contributed to the marke increase in stock biomass in recent years. The time series of mean spawning stock biomass (1000s MT) is given in th table below:

1962- 191.2	1973- 916.8	1984- 876.8
1963- 208.8	1974- 708.5	1985- 1444.5
1964- 229.2	1975- 558.0	1986- 1449.1
1965- 250.7	1976- 498.2	1987- 1305.5
1966- 278.4	1977- 552.0	1988- 1305.3
1967- 307.7	1978- 734.2	1989- 1307.7
1968- 577.0	1979- 697.0	1990- 1462.4
1969- 1037.0	1980- 642.3	1991- 1669.0
1970- 1166.6	1981- 525.5	1992- 1789.2
1971- 1219.5	1982- 494.6	1993- 1935.3
1972- 1268.5	1983- 434.5	

The projected mean spawning stock biomass is estimated to be 2.1 million MT in 1994 with current F = 0.02 (2% exploitation rate). At this stock biomass level, an $F_{0.1}$ catch is projected to be greater than 400,000 MT in the short ter The reference is $F_{0.1}$ = 0.27 (21% annual exploitation rate). While the mean spawning stock is unusually high, the standard error of the mean is also extremely high resulting in an 80% confidence interval of 1.2-8.2 million MT.

A recent Canadian assessment confirmed the conclusion that the Atlantic mackerel stock is currently at a high level o abundance (Gregoire 1996). Results of spawning stock size projections based on egg production in Canadian waters indicated that the northern (i.e., Canadian) portion of the adult stock remained constant at around 800,000 mt betweer 1992 and 1994. The Canadian assessment concluded that Atlantic mackerel stock biomass remains high and further that the appearance of one and two year old fish (the 1993 and 1994 year classes) in the 1995 Canadian catch indicates that two very large year classes are entering the fishery.

Historically, catches of Atlantic mackerel have been dominated by large foreign fleets, especially during the late 1960 and early 1970's. The stocks were at relatively low levels for most of the 1960's and began to rebuild toward the end that decade reaching a mean biomass of 1.3 million MT. However, substantial fishing pressure by the foreign fleets ir the early 1970's ranging from catches of 205,000 MT to 379,808 MT caused a collapse of the stock to a point where tl stocks were overfished per the overfishing definition which appears in Amendment 3 to the FMP. The definition states that the stock of Atlantic mackerel will be considered to be overfished when mean spawning stock biomass is less tha 600,000 MT.

A 1988 study by the Northeast Fisheries Center of recent trends in growth showed that cohorts from 1980 to 1988 wer growing much more slowly and that average size of fish had declined by 30-40 percent. Predation on young Atlantic mackerel, primarily ages 1 and 2, had increased; predation mortality rates on large year classes were higher than on smaller ones. Results from modeling exercises suggested that recent assessments had correctly followed new trends this stock, but advice based on a standard single species model had been too optimistic. Stock rebuilding had been very successful as suggested by the very large estimated spawning stock biomass which exceeded 1.4 million MT by 1985. However, if catches were increased at that time to 150,000-200,000 MT, the spawning stock would not have been appreciably lowered, density dependency may have been relieved, and trends in growth could have been reversed.

3.3 Ecology of the Stock

Ecological relationships were discussed at length in the original fishery management plan for Atlantic mackerel and its accompanying environmental impact statement (1978). These relationships are summarized below.

3.3.1 Prey and Predator Relationships

Atlantic mackerel have been identified in the stomachs of a number of different fish. They are preyed upon be spiny dogfish, silver hake, white hake, weakfish, goosefish, and Atlantic cod. They also comprise part of the diet of swordfis red hake, Atlantic bonito, bluefin tuna, blue shark, porbeagle shark, sea lamprey, shortfin mako, thresher sharks, harb porpoise, and several species of whales and dolphin.

Atlantic mackerel prey most heavily on crustaceans such as Copepoda, krill, and shrimp. They also feed on squid, ar less intensively on fish and ascidians. Investigations into the relationship between a large stock of mackerel and the rates of growth and recruitment of groundfish, such as cod and haddock, have yielded some interesting data suggesti that a relationship may exist. The data, however, is inconclusive and any causal relationships are speculative at this time.

3.3.2 Relationship between Atlantic sea herring and Atlantic mackerel

The Atlantic sea herring and the Atlantic mackerel share common characteristics, i.e., distribution, abundance, and si Ecologically, they can be described as pelagic, schooling and fast swimming zooplankton feeders associated with similar water masses along the continental shelf of the northeast coast of the United States from Cape Hatteras, rangi in winter to boreal waters. Morphologically, both species are laterally compressed and possess pronounced visual acuity. Their general feeding strategies are also alike as either can select prey items or "filter feed". With so many similar niche parameters a measurable degree of overlap between food resources might be expected.

In the spring of 1974, the Northeast Fisheries Center initiated a preliminary study to investigate the similarities and measure the overlap of the food habits of herring and mackerel.

A total of 32 different prey items was identified in the stomachs of Atlantic sea herring. Chaetognaths dominated the diet by weight (43%) and number (68%). Euphausiids as a group accounted for 34% of the stomach content weight, b only 0.6% of the numbers.

A total of 38 different prey were identified for Atlantic mackerel. Copepoda (32.7%) and pteropods (33.5%) contribute almost equally to diet weight with smaller Copepoda constituting 81.5% of the diet numbers.

4.0 Economic and Social Environment

4.1 Commercial Fishery

4.1.1 Current Market Overview for Mackerel

According to the FAO, world landings of Atlantic mackerel have been on an increasing trend. In 1993, Atlantic mackerel world landings were estimated to be 841,000 mt. This represented a 7% increase from the 1992 landings (FAO 1993). Production of frozen mackerel (all species) increased from 1.2 million mt in 1994 to 1.4 million mt in 1996 (FAO 1996).

Mackerel had been reported to be in short supplies in major international markets prior to 1997 (FN 1995, ITN 1996 and 1996a, FAO 1996, and SFI 1996). Limited supplies have generated intense pressure in the European Union (EU) mackerel market (ITN 1996a). This situation appeared unchanged through 1997. Large quantities of mackerel have been purchased by East European countries like Poland Russia, and Latvia. These purchases have increased pressure on prices, while leaving fewer supplies for more traditional markets such as Japan (SFI 1996). Quota reductions in western mackerel grounds are creating additional market uncertainty. Present market conditions might be expected to cause larger traders to increase “sourcing” and prices are likely to stay high or increase further.

Canada and Jamaica continued to be the two most important markets for U.S. mackerel during the early to mid-1990's. Jamaica has been considered as one of the most steady and promising markets for US frozen mackerel. In 1995, the US exported 985 mt of frozen mackerel to Jamaica, this represented a 68% increase from 1994, and a 22% decrease from the 1991-1994 average. The frozen mackerel exported to Jamaica in 1995 was valued at $641/mt, this was the highest mackerel exported value to that country since 1993. In 1996, the US exported 1,830.3 mt of Atlantic mackerel to Jamaica at an average price of $820/mt. In 1995, Canada purchased 1,269 mt ($798/mt) of frozen mackerel from the US, this represented a 120% increase from 1994, and a 303% increased from the 1991-1994 average. The overall US export of fresh/chilled and frozen mackerel in 1995 was estimated at 3,296 mt, this represented a 12% increase from 1994, and a 22% decrease from the 1991-1994 average (Ross 1996). In 1996, the US exported 3501 mt of Atlantic mackerel to Canada.

Total US exports of Atlantic mackerel continued to increase in 1996 to 6137 mt valued at $5.3 million. Total US exports of all mackerel species was 17,367 mt valued at $14 million. Canada continued to be the largest importer of US fresh mackerel in 1998 (341 mt valued at $1.0 million). Japan was the largest importer of US frozen mackerel in 1998 (5,804 mt valued at $3.5 million) followed by Australia (2,917 mt/$1.7 million), Jamaica (1,742 mt/ $1.65 million), Canada (1,579 mt/$1.3 million), Hong Kong (1,005 mt/$1.1 million), Philippines (901 mt/$1.1 million), and Uruguay (839 mt/$ 0.7 million). US exporters placed an additional 139 mt of prepared/preserved mackerel products in foreign markets in 1998 valued at $0.2 million.

National Marine Fishery Service weighout data (Maine-Virginia), shows that the average exvessel prices for Atlantic mackerel in the US declined steadily from $400/mt ($0.18/lb) in 1989 to $281/mt ($0.13/lb) in 1994. Since then, however exvessel prices have moved upward from $296/mt ($0.13/lb) in 1994 to $321/mt ($0.15/lb) in 1995 (based on preliminary NMFS data). NMFS weighout data also show that US commercial landings of Atlantic mackerel have increased from 4,653 mt in 1993 to 8,438 mt in 1995. Preliminary NMFS data indicate that US Atlantic mackerel landings increased to 15,712 mt in 1996. Ex-vessel prices for Atlantic mackerel declined slightly in 1996 to $296/mt ($0.13/lb) and then increased to $376/mt ($0.17/lb) in 1998.

4.1.2 Criteria for Review

The Management Plan for Atlantic Mackerel, Squid, and Butterfish Fisheries requires that specific evaluations be mac in the quota setting process before harvest rights are granted to foreign interests in the form of TALFF or joint venture allocations. The nine criteria to be evaluated in the following sections are:

1. total world export potential by producing countries;
2. total world import demand by consuming countries;
3. US export potential based on expected US harvests, expected US consumption, relative prices, exchange rat and foreign trade barriers;
4. increased/decreased revenues to the US from foreign fees;
5. increased/decreased revenues to US harvesters (with/without joint ventures);
6. increased/decreased revenues to US processors and exporters;
7. increases/decreases in US harvesting productivity due to decreases/increases in foreign harvest;
8. increases/decreases in US processing productivity; and
9. potential impact of increased/decreased TALFF on foreign purchases of US products and services and US caught fish, changes in trade barriers, technology transfer, and other considerations.

4.1.3 Major Producers of Atlantic Mackerel

World Atlantic mackerel landings were estimated at 841,445 mt in 1993, this represented a 7% increase from the 1992 landings (FAO 1993). Since then the world production of mackerel has declined. World Atlantic mackerel landings were estimated at 564,039 mt in 1996 (FAO 1996). The leading producers of Atlantic mackerel in 1993 were the United Kingdom, Norway, Ireland, Russian Federation, USSR, the Netherlands, and Denmark (FAO 1993):

Country	1993 Landings (mt)	1996 Landings (mt)
United Kingdom	253,058	144,964
Norway	223,838	136,446
Ireland	94,979	49,966
Russian Federation	46,716	43,046
USSR	44,140	-
Netherlands	42,532	24,246
Denmark	42,056	26,238
Others	94,126	139,133
Total	841,445	564,039

4.1.4 Major Exporters of Mackerel

According to FAO statistics, total global mackerel exports (all species of mackerel combined) in 1993 were estimated at 945,206 mt and valued at $454 million. This represented an increase in exports and value of 12% and 3.6% from 1992, respectively (FAO 1993a). Total global mackerel exports (all species of mackerel combined) in 1996 declined to 819,214 mt (a 13% decline compared to 1993). However, the total value of exports increased to $753 million. In 1993, major exporting countries of mackerel (fresh/frozen/chilled) include Norway, United Kingdom, Ireland, and the Netherlands (FAO 1993a). In 1996, Korea and the US exports of mackerel products exceeded that of the Netherlands (FAO 1996).

Country	1993 Exports (mt)	1996 Exports (mt)
Norway	293,854	216,257
United Kingdom	216,517	138,930
Ireland	161,772	126,229
Netherlands	104,777	48,768
Korea	10,329	60,242
USA	4,273	58,872
Other	153,684	169,916
Total	945,206	819,214

4.1.5 Major Importers of Mackerel

According to FAO statistics, global mackerel imports (fresh/frozen/chilled) in 1993 were estimated at 770,165 mt, and valued at $446 million. This represented an increase in imports and value of 12% and 6.6% from 1992, respectively (FAO 1993a). Major importing countries of mackerel (fresh/frozen/chilled) in 1996 included Japan, Philippines, Norway, Egypt, and the Russian Federation (FAO 1996):

Country	1993 Imports (mt)	1996 Imports (mt)
Japan	211,030	120,548
Nigeria	99,289	27,149
Norway	60,789	96,810
Netherlands	38,387	24,589
Poland	36,940	38,579
France	26,756	31,624
Côte d'Ivory	24,440	16,522
Russian Fed.	-	81,701
Egypt	15,819	82,478
Philippines	-	103,988
Thailand	15,038	41,873
Other	241,677	175,480
Total	770,165	923,819

4.1.6 Key Events in the World Mackerel Market

Much of what is important in the world market for mackerel revolves around events in a few key nations and markets. the late 70's and early 80's Japan was the world's leading producer of mackerel (FAO 1982 and USITC 1993). Since then, Japan's mackerel landings have declined annually. In 1991 Japans' mackerel landings reached an estimated lo of 255 thousand mt. Since then, landings have increased to 665 thousand mt in 1993, making Japan again a leading world producer (FAO 1993) -- still, this landing figure represents over a twofold decrease from the 1978 record landinç by Japan. Japan is also the leading importer of mackerel. In 1993, Japan imported over 211 thousand mt of mackere (27% of the world total). This represented a 50% increase in Japan's mackerel imports compared to 1992 (FAO 1993

Japan's strong yen, changes in global trade policies, and changes in internal market needs had made Japan a major fisheries importing country. Japan imported 3.3 million mt of fishery products valued at $17.89 billion in 1994. Impor of fish meal and valued added products have been on the increase in the last few years (ITN 1995).

In 1993, mackerel exports for Norway and the United Kingdom were over 54% of the world total (FAO 1993a). Norwa has traditionally been an important supplier to the Japanese market. However, in 1995 the Norwegian mackerel catcl in the North sea declined to 202 thousand mt, which represented a 22% decrease from the previous year. Recently, Norway has also exported large quantities of mackerel to Eastern European countries like Poland, Russia, and Latvia leaving lower quantities to be exported to traditional markets such as Japan (SFI 1996). This event has contributed tc recent price pressures for this commodity.

An important advantage that Norway and the United Kingdom have over the United States is the distinct characteristic that Atlantic mackerel from European waters has compared with the same species off the northeast coast of the US. European mackerel has a higher fat content than their North American counterparts(at the time that the bulk of the commercial fishery is prosecuted), as well as reaching a larger average size and having a "blunter," deeper shape. A these characteristics appeal to the Japanese market and cause them to prefer European mackerel to our own (Ross 1994). Size is very important, 600+ gram fish command twice the price of smaller fish.

4.1.7 The Current World Market for Mackerel

Strong warnings were issued in 1996 by European scientists about the potential collapse of the European Atlantic mackerel stock. Large cuts in the total allowable catch (TAC) have been recommended to restore the spawning stock biomass to safe levels. While in recent years the TAC for this stock has remained high, European mackerel stocks ar currently at the lowest level ever recorded (FN 1995a and FNI 1995).

As the fishing quota for the North sea mackerel was reduced for the 1996 season, canners were actively trying to execute existing orders. Reports surfaced that "processors in Denmark and Scotland may be interested in frozen mackerel from other sources if the price is competitive" (ITN 1996).

East European and Japanese buyers have been very active. This is likely to cause prices to remain high in the near future (ITN 1996a).

The Norwegian government relaxed buying controls for pelagic catches from October 15, 1995 to January 1, 1996 (FI 1995). Those buying controls -- imposed by the Norwegian fisheries department -- force all pelagic catches landed in Norway to be sold at auctions through *Norges Sildesalgslag* (the Norwegian sales organization). This prevents Norwegians processors from buying mackerel from foreign vessels until all the Norwegian quota is taken. Buying controls were relaxed following the 20% cut in the Norwegian mackerel quota, it was expected that this move would have helped processors to secure raw material to supply important markets.

Japanese cold storage of frozen mackerel (horse mackerel and chub mackerel) was 82,406 mt as of April 30, 1996, u 20% from a year earlier (ITN 1996b). Although cold storage of frozen mackerel is up in Japan, buyers in that market a still showing strong demand for European mackerel.

A new mackerel cannery began operations in Papua New Guinea under the management of Malaysia's Kumpulan Fin group. This facility is expected to produce 36,000 mt of canned mackerel per year, 4,000 more mt than is needed to supply the domestic demand. The surplus production will be exported (ITN 1995a). The cannery is expected to operat on domestic and imported fish (FAO 1995).

4.1.8 Future Supplies of Mackerel

Prospects for the European mackerel stock look poor. Europe's western mackerel (ICES areas VI & VII) TAC for 199 was cut by 55% (FNI 1996). In addition, further reductions to the TAC were agreed for the 1997 fishing year. The 199 reductions were far above the European scientific recommendations. According to European scientific recommendations, large cuts in mackerel TACs were needed in 1996 to restore the spawning stock biomass to a minimum biologic threshold of 2.3 million mt by 1997-1998. That means that fishing mortality in 1996 would need to be reduced by 80% compared to 1994 in one year. In other words, to achieve this biological goal, the overall western mackerel TAC in 19 should have been reduced to 144 thousand mt compared with 762 thousand mt in 1994 (FNI 1995 and FN 1995a). In fact, the TAC's agreed upon for the European mackerel stocks decreased from 837,000 mt in 1994 to 645,000 mt in 1995 and finally to 452,000 mt in 1996. Actual landings exceeded the TAC specifications in 1994 and 1995 when European landings of Atlantic mackerel were 823,000 and 756,000 mt, respectively.

In Peru 40 medium size fishing vessels (490 to 750 cu. meters) were built to fish for underutilized species (including mackerel) as that country's stocks of sardines and anchovies face increasing pressure (FNI 1995a). Steps are being taken in Chile by some fishing companies to establish mid-water trawling for jack mackerel. It is expected that this ty of operation will have the capability to reach deeper waters, thus adding more flexibility to the existing efficient purse seining operations (FNI 1996a).

Namibia's horse mackerel stock looks very strong. Since its independence, that country has increased catches from about 300,000 mt to more than 400,000 mt (FNI 1995b). African markets have expanded at a very fast rate. Most ho mackerel are sold frozen in those markets (FNI 1995c).

4.1.9 US Production and Exports of Mackerel

NMFS weighout data showed that in 1995, Atlantic mackerel landings increased by 81% from the 1993 level. The average value of mackerel increased over 14% for the same period.

In 1991, landings peaked due to a relatively successful internal water processing venture between Russia and the state of New Jersey, and the one-year open door into the Japanese market. That year US producers were able to ship over more than 2,800 mt of frozen mackerel to Japan at an average value of $882/mt. The following year shipments fell to only 63 mt.

Overall, US exports of fresh/chilled and frozen mackerel in 1995 were estimated at 3,296 mt, this represented a 12% increase from 1994, and a 51% increase from 1993 (Ross 1996). In 1995, US producers were able to export 2,303 mt of frozen Atlantic mackerel valued at $1.7 million ($747/mt), and 992 mt of fresh/chilled mackerel valued at $1.5 million ($1,207/mt). US exports of Atlantic mackerel continued to increase in 1996 to 6,137 mt valued at $5.3 million. US exports of all mackerel species were 17,367 mt valued at $14.2 million in 1998.

The lack of mackerel in the North Sea area and the potential for future mackerel TAC reductions are providing opportunities for US producers to place additional exports of mackerel in the international market. Mackerel prices in the international market have increased in recent years which should help the US Atlantic mackerel industry in their attempt to sell large volumes of this product (Ross 1996). In 1995, the

US exported small quantities of Atlantic mackerel to non-traditional markets such as South Korea, Mexico, and Brazil. In 1996, US exporters placed Atlantic mackerel in Latvia, the Philippines, and South Africa.

4.1.10 Trade Barriers

Japan- has started to phase in tariff reductions on 219 fisheries items entering the country. These reductions have been approved through GATT negotiations. Mackerel is one of the major fishery products subject to tariff reduction (IT 1995b). The tariff of frozen mackerel will be reduced from a 10% base rate to a new rate of 7%. This rate will be reduced over a 5 year period beginning in 1995. The stated base rate has already had the first tariff reduction taken out. The mackerel base rate in 1995 was 10% with 0.6% reduced each year for 5 years until the rate gets to 7%. This tariff rate reduction is not "bound", therefore, rates may increase at some future date depending on market conditions Japan (Ross 1995). The tariff for horse mackerel remain unchanged (ITN 1995b).

The Republic of Korea's- National Fisheries Administration has announced the liberalization of fish imports for 1995 1997. Liberalization of the following mackerel products are expected (ITN 1994):

Date	Item
July 1, 1996	Mackerel (excluding livers)
July 1, 1996	Mackerel (prepared/canned goods)
July 1, 1997	Mackerel (excluding livers and roes/fresh or chilled)

Korea has agreed to establish an import tariff rate of 10% on most fresh/frozen/dried seafood and 20% on prepared preserved food (Ross 1995).

The European Community- has a seasonal tariff on mackerel. During the EC peak season of June 16 - February 14 an unchanged 20% tariff is levied on foreign imports of mackerel (fresh/chilled fish excluding fillets). For fresh/chilled/frozen mackerel fillets and other mackerel meat there is a 15% year-round tariff (ITN 1994a and 1994b).

Taiwan- has requested membership in the World Trade Organization/GATT. US negotiators have been working to reduce existing Taiwanese barriers to various seafood products. In addition to significant reductions in key Taiwanese import tariffs, several Non-Tariff Measure (N.M.) which affect regional exporters are also to be reduced. At the presen time, imports of squid, mackerel, sardines, herring, and catfish are not allowed into the country. The Taiwanese government has proposed to liberalize the NTM's over a 6-year phase-in period, except squid which will be liberalized 1997 (Ross 1995).

Peoples Republic of China- is expected to drop import tariff rates once it becomes a member of GATT. The import tariff rate for frozen mackerel is expected to go from the base rate of 30% to the proposed rate of 15% (Ross 1995).

US- Has made concessions on 46 tariff lines. Canned mackerel is one of the major fishery products subject to tariff reduction, which has been reduced from 6 to 3% (ITN 1995c).

4.1.11 Processor Survey Results for Mackerel

Each year the Mid-Atlantic Council surveys East Coast processors to ascertain their expectations on current and future mackerel production. Totals are not directly comparable between years because the respondents (and their numbers) will differ from year to year.

Production estimates for Atlantic mackerel are as follows (mt):

Product/Market	1999 (15 Reporting)	2000 (7 Reporting)
US Food Market	5,280	1,900
US Bait Market	5,489	3,100
Foreign Export Market	27,466	21,400
TOTAL	38,235	26,400

Given the number of number of reporting units in 2000 these production estimates will likely increase due to the lower number of respondents. A number of the larger known processors failed to return the survey. One firm indicated that they were interested in establishing joint ventures for mackerel in the amount of 10,000 mt.

In order to more accurately assess processors' expectations, amounts expected to be processed in 1999 v. 2000 were compared for only those firms which provided estimates for both years. For these firms, projected needs increased 98% for 2000.

4.1.12 Costs and Benefits of JVs and TALFF

The presence of foreign fishing and processing vessels off US shores has long been a controversial matter, usually drawing strong opinions on both sides of the issue. The following sections attempt to highlight some of the benefits ar costs of foreign involvement in the US mackerel fishery. A simple numerical calculation is not feasible, as most of th positive and negative aspects cannot be quantified. Ultimately, a policy decision must be made as to which course o action is in the best interests of the US.

4.1.13 Benefits of Foreign Involvement

Providing an Additional Market Outlet - The greatest benefit which foreign nations can provide in return for their involvement is the purchase of US mackerel products, both shoreside and directly from US vessels. The conditions c these purchases have been the chief stumbling block in the past. Most foreign nations have stated that they cannot afford to bring their fleets over here and purchase US product without a substantial subsidy of TALFF. US fishermen have often held little interest in participating in joint ventures at the prices which foreign nations have been willing to p for their mackerel harvests.

Fees - The US government charges a number of fees to foreign nations for the right to conduct fishing operations in U waters. The first is a permit fee of $354 per vessel, which is charged to all vessels whether they are taking directed (TALFF) harvests or simply making over-the-side JV purchases. The level of this fee has not changed in many years

An additional "poundage fee" is charged for every ton of directed (TALFF) harvest made by the foreign nation. It is n charged on over-the-side JV purchases from US vessels. The fee is charged in advance in the sense that a letter of credit must be presented for the entire TALFF authorization before releases will be made to foreign vessels. The US government will draw down the letter of credit as foreign harvests are made.

The poundage fee will vary depending on the species for which TALFF is issued, and may change over time. In 1989 and 1990, the fee equaled $68.43 per metric ton for Atlantic mackerel, and was lowered to $58.33 in 1991, where it remains today. Using these values, the US government would have received the following revenues:

Year	TALFF	Revenue
1989	36,823	$2,520,000
1990	8,671	$593,000
1991	5,349	$312,000

Observers would be placed on any vessel which was involved in fishing or processing operations. Current observer fe would be on the order of $650 per day per observer, and are paid directly to the contracting firm utilized by the federa government.

Finally, NMFS charges an overhead fee of approximately $150 per day to cover the expenses of some of their persor in overseeing foreign operations.

Technology Transfer - As occurred in the development of the US squid fishery, it is likely that transfer of information and experience can occur which would assist US firms in producing mackerel products for markets with which they ar unfamiliar.

Assistance in Entering Foreign Markets - While it is not in the direct interest of the key mackerel exporting nations to assist the US in entering their markets, it is conceivable that an arrangement of mutual benefit could be worked out.

Assistance in Locating Stocks - While engaged in past joint ventures for mackerel, foreign partners have been of assistance to US catcher boats in locating schools.

4.1.14 Costs of Foreign Involvement

Opposition of US Industry - Perhaps the largest negative factor related to foreign involvement in the mackerel fishery simply that much of the domestic industry is dead set against it. At public meetings where joint venture and TALFF issues are discussed, most industry spokesmen will agree that there is still value in allowing US boats to make over-th side sales of mackerel to foreign processing vessels, however they are vehemently opposed to any directed fishing of the foreign vessels themselves.

Filling US Markets - A long-standing charge which has been leveled against directed foreign fishing is that it displaces US harvests and sales. One known case in point is where a foreign vessel made directed harvests off the US and the proceeded down the coast to sell some of its catch in Jamaica, one of the few markets which the US has successfully entered.

The degree to which this has happened in the past or may occur in the future is debatable, however it is a fact that it i not in the best interests of the US to give away its national resources for free to the same nations could otherwise be purchasing them.

Lack of Reciprocal Access to Fishing Grounds - A telling point made by members of the US industry is that while European nations have requested the right to fish in US waters, there has been no corresponding invitation to the US industry to fish in their waters.

Administrative Nightmare - While it is conceivable that the administration of foreign fishing ventures could someday evolve into an efficient and timely process, experiences to date have been described as an administrative nightmare. The highly contentious nature of these ventures have led to countless hours of debate at Council meetings, at a very high cost to both the government and public in the form of their time and travel expenses.

The oversight, review, and enforcement of the conditions of these ventures have required significant efforts from: the State Department, NMFS officials in Washington, and NMFS personnel in Gloucester and Woods Hole, at the very le It has been said on many occasions that with many of the valuable fisheries resources off the East Coast in severe jeopardy, that we can simply not afford to dedicate such an inordinate amount of time and money to one of the least valuable.

Concerns of Recreational Fishermen - US recreational fishermen have been vocal opponents of the operations of foreign vessels in the mackerel fishery. Many have blamed their activities for a drop in recreational mackerel harvest While scientists have pointed to the effects of water temperature and the timing of migrations as the primary reasons Mid-Atlantic anglers not finding mackerel available to them in recent years, their concerns have persisted.

4.1.15 Domestic Market

The domestic market for Atlantic mackerel is very small. American consumers appear to desire fish with a mild taste and white flesh. This represents a distinct change in consumer taste and preference over the years, especially when compared to the 1930's and 1940's when large quantities of Atlantic mackerel were consumed on the east coast of the United States.

4.1.16 Joint Venture Market

Historically, much of the harvest of Atlantic mackerel by domestic vessels has been sold over-the-side to foreign facto trawlers. These joint venture processing (JVP) activities can evolve in two ways. Firstly, the foreign country may app directly for a certain tonnage of joint venture sales. Secondly, the foreign country may apply for a specific amount of TALFF. Subsequently, the foreign country would be required to accept a predetermined amount of over-the-side sale from domestic trawlers and buy a predetermined amount from domestic processors. The predetermined amounts of JVP and direct purchases would be relative to the amount of approved TALFF and would be derived through the use a ratio.

4.1.17 Recreational Fishery

The Atlantic mackerel is seasonally important to the recreational fisheries of the Mid-Atlantic and New England regions. They are available to recreational anglers in the Mid-Atlantic primarily during the spring migration. Historically, mackerel first appear off Virginia in March and gradually move northward. Christensen *et al.* 1979 found mackerel to be available to the recreational fishery from Delaware to New York for about three weeks (generally from early April to early May). As a result, the annual recreational catch of mackerel appears to be sensitive to changes in their migration and subsequent distribution pattern (Overholtz *et al.* 1989).

Since 1979, recreational mackerel landings have varied from 284 mt in 1992 to 4,032 mt in 1987. In recent years, recreational mackerel landings have increased steadily from 1,249 mt in 1995 to 1,736 mt in 1997. Recreational mackerel landings occur from Virginia to Maine, with highest catches from New Jersey to Massachusetts. New Jersey accounted for 37% of the recreational mackerel landings for the period 1979-1991, followed by Massachusetts (25%) with the remaining States landing roughly equal amounts of Atlantic mackerel

5.0 Alternative Actions

5.1 Maintain 1999 specifications for 2000

The first Alternative action considered by the Council was to maintain the 1999 specifications for Atlantic mackerel for 2000. These specifications are given in Table 2 below:

TABLE 2. FINAL INITIAL ANNUAL SPECIFICATIONS FOR ATLANTIC MACKEREL FOR THE FISHING YEAR JANUARY 1 THROUGH DECEMBER 31, 1999 (in metric tons (mt))

Max OY	N/A[1]
ABC	382,000
IOY	75,000
DAH	75,000[2]
DAP	50,000
JVP	10,000
TALFF	0

[1] Not applicable; see the FMP.

[2] Contains 15,000 mt projected recreational catch based on the formula contained in Amendment 5.

The 1999 specification of ABC at 382,000 mt would not be valid for 2000 since overfishing definition adopted in Amendment 8 resulting in a lower specification of ABC.

5.2 Specify ABC at long term potential catch

The Council had proposed that the ABC specification be capped at long term potential catch (LTPC). The most recer estimate of LTPC was 134,000 mt. The use of LTPC as an upper bound on ABC was found to be inappropriate because it would not allow for variations and contingencies in the status of the stock. For example, the current adult stock was recently estimated to exceed 2.1 million mt. The specification of ABC at LTPC would effectively result in a exploitation rate of only about 6%, well below the optimal level of exploitation. The level of foregone yield under this alternative was considered unacceptable.

5.3 Specify JVP at 0 mt

Another alternative the Council considered was the elimination of JVP for 2000. The Council rejected this option because they recognized the need for JV's in 1999 to allow US harvesters to take mackerel at levels in excess of curr US processing capacity. However, in the future the Council intends to eliminate JV's as US processing and export capacity increases.

6.0 Impacts of the proposed action on the environment

6.1 Impact of the IOY

The specification of IOY for 2000 is 75,000 MT. This level of exploitation will not cause a significant change in the me biomass estimate from its present state.

Although the trend has been declining, the smoothed mean weight of the fish had ranged between 1.723 and 1.881 pounds for the period 1987 to 1990. From 1970 to 1986, the smoothed mean weight ranged between 0.348 and 1.482 These levels of IOY should not cause immediate significant changes in the size of individual fish. However, the size composition of this stock of fish is much greater than historical levels.
The effects of a continued large stock of Atlantic mackerel on other species of fish are determined primarily through prey- predator relationships (see section 3.3). The diet of Atlantic mackerel is made up primarily of crustaceans and, a lesser extent, other fish. However, several species of fish prey on Atlantic mackerel including commercially importa species such as Atlantic cod, swordfish, and bluefin tuna. Mackerel are also an important item in the diet of endangered and threatened marine mammals.

6.2 Impacts of TALFF

The zero TALFF recommendation is based on the fact that mackerel caught by foreign vessels in US waters enters th world market in direct competition with mackerel harvested by US vessels. In 1992 and again in 1995, the Council conducted an analysis (see Appendix) which concluded that specification of zero TALFF will yield positive benefits to the fishery and to the Nation. Subsequent analyses in more recent quota papers indicated that the conclusion about zero TALFF has not changed. Based on a review of the state of the world mackerel market and recent production levels this year, the Council again concluded that the specification of zero TALFF will yield positive benefits to the fishery and to the Nation. The TALFF specification of zero will have no significant impact on the biological or ecological parameters of the present mackerel stock.

6.3 Impacts of JVP

The Council recommended that initial JVP be specified at 10,000 mt and TALFF be specified at 0 mt. The Council also endorsed a provision for an in-season increase in the JVP specification to a maximum JVP specification of 15,000 mt by the Regional Administrator should the need arise during the 2000 fishing season. This provision would give the Regional Administrator the discretion to increase the JVP specification by up to 5,000 mt without further consultation with the Council. The JVP specification represents a decrease from 15,000 mt in 1998, 25,000 mt in 1997 and 35,000 mt in 1996. The Council had specified JVP at 35,000 mt for several years, but there has been little or no joint venture activity for several years. The 1999 specification was reduced to reflect the concern that the Council has about the negative effect that JV caught macker could have on the further development of the US export market. The lack of mackerel in the North Sea area and the potential for future North Sea mackerel TAC reductions may provide an opportunity for US producers to place additio exports of mackerel in the international market. Mackerel prices in the international market are increasing, which sho help the US Atlantic mackerel industry in their attempt to sell large volumes of this product. Recommendations for JV any higher than those specified (10,000 mt) could impede US competitiveness in these expanding international marke The Council intends to proceed on a policy course which recognizes the need for JV's in the short term to allow US harvesters to take mackerel at levels in excess of current US processing capacity. However, in the longer term the Council intends to eliminate JV's as US processing and export capacity increases.

The specification of 10,000 MT of JVP will have a no effect on the biological and ecological parameters of the current stock of Atlantic mackerel.

7.0 Impacts of Alternative Actions

7.1 Maintain 1999 Specifications in 2000

The IOY specification for Atlantic mackerel for 1999 was 75,000 mt. The 1999 specifications included ABC specified the yield associated with fishing mortality rate of $F_{0.1}$. Overfishing in Amendment 8 is defined to occur when the catch associated with a threshold fishing mortality rate of F_{msy} is exceeded. When SSB is greater than 890,000 mt, the overfishing limit is F_{MSY} (F=0.45), and the target F is the tenth bootstrap percentile of F_{MSY} (F=0.25). To avoid low levels of recruitment, the threshold F decreases linearly from 0.45 at 890,000 mt SSB to zero at 225,000 mt SSB (1/4 B_{MSY}), and the target F decreases linearly from 0.25 at 890,000 mt SSB to zero at 450,000 mt SSB (½ B_{MSY}). Annual quotas are be specified which correspond to a target fishing mortality rate according to this control law. The yield associated with the target fishing mortality rate of F=0.25 adopted in Amendment 8 is 369,000 mt. Therefore, the ABC recommendation consistent with Amendment 8 is 347,000 mt (F=0.25 yield estimate of 369,000 mt - the estimated Canadian catch of 22,000 mt).

7.2 Specify ABC for Atlantic Mackerel at LTPC

The specification of ABC at 134,000 MT for Atlantic mackerel would have a minimal effect on the biological and ecological parameters of the current stock of Atlantic mackerel. The effects of a continued large stock of Atlantic mackerel on other species of fish are determined primarily through prey- predator relationships (see section 3.3). The diet of Atlantic mackerel is made up primarily of crustaceans and, to a lesser extent, other fish. However, several species of fish prey on Atlantic mackerel including commercially important species such as Atlantic cod, swordfish, ar bluefin tuna. Mackerel are also an important item in the diet of endangered and threatened marine mammals.

7.3 Specification of Zero JVP

Several processors commented to the Council that the specification of JVP should be set at zero for 2000. The reaso they took this position was that JVP caught mackerel will compete directly with US caught and processed mackerel in the international marketplace. While the Council was sympathetic to this position, US processing capability is current limited and is below the level of potential production by US harvesters. Thus, the Council rejected the no JVP positio for the 2000 specifications. While a zero JVP specification would have had social and economic consequences, it would have had a minimal effect on the biological and ecological parameters of the current stock of Atlantic mackerel

8.0 Atlantic Squids and Butterfish

The proposed initial specifications for the 2000 Atlantic squid and butterfish fisheries are contained in Table 3 below.

TABLE 3. PROPOSED INITIAL ANNUAL SPECIFICATIONS FOR THE ATLANTIC SQUID AND BUTTERFISH FOR THE FISHING YEAR, JANUARY 1 THROUGH DECEMBER 31, 2000 (in metric tons (mt)).

Specifications	Squid		Butterfish
	Loligo	Illex	
Max OY[1]	26,000	24,000	16,000
ABC	13,000	24,000	7,200
IOY	13,000	24,000	5,900
DAH	13,000	24,000	5,900
DAP	13,000	24,000	5,900
JVP	0	0	0
TALFF	0	0	0

[1] Maximum OY as stated in the FMP.

8.1 Atlantic Squid

8.1.1 Description of the Fisheries

The short-finned squid (*Illex illecebrosus*) and long-finned squid (*Loligo pealei*) are found throughout the North Atlantic They are found in commercial quantities along North America from Newfoundland to Cape Hatteras. Both species undergo seasonal migrations into shelf waters off Newfoundland and Nova Scotia, and onto the continental shelf edge off southern New England and the Mid-Atlantic in spring and summer. *Illex* grow to a maximum length of about 35 cm (14 inches, dorsal mantle length) and live about 12 months. *Loligo* reach lengths of over 16 inches, dorsal mantle length, and ages of about one year. However, most individuals taken in commercial catches are 3-8 inches long.

Domestic fishing effort occurs while the *Illex* are concentrated in large schools along the continental shelf. Virtually al (99%) of the directed fishery landings are during June-September with 98.6% from the area south of Delaware Bay. *Illex* move off the continental shelf in winter and spawning may occur offshore and to the south of Cape Hatteras. Domestic landings for *Loligo* are now generally distributed through the year.

8.2 Status of the Stocks (Report of the Twenty-ninth Northeast Regional Stock Assessment Workshop)

Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management (FMP) was developed to bring the FMP into compliance with the Sustainable Fisheries Act (SFA). The SFA, which reauthorized and amended the Magnuson-Stevens Act, made a number of changes to the existing National Standards, as well as to definitions and other provisions in the Magnuson-Stevens Act, that caused the Guidelines to be significantly revised. The most significant changes were made to National Standard 1, which imposed new requirements concerning definitions of overfishing in fishery management plans. The overfishing definition for *Loligo* was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Loligo* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{max} is exceeded (F_{max} is a proxy for F_{msy}). When an estimate of F_{msy} becomes available, it will replace the current overfishing proxy of F_{max}. Annual quotas will be specified which correspond to a target fishing mortality rate. Target F is defined as 75% of the F_{msy} when biomass is greater than B_{msy}, and decreases linearly to zero 50% of B_{MSY}. Maximum OY will be specified as the catch associated with a fishing mortality rate of F_{max}. In addition, the biomass target is specified to equal B_{MSY}.

The most recent assessment of the *Loligo* stock (SAW 29) concluded that the stock is approaching an overfished condition and that overfishing is occurring (NMFS 1999). A production model indicated that current biomass is less than B_{msy}, and near the biomass threshold of 50% B_{MSY}. There is high probability that fishing mortality exceeded F_{msy} in 1998. The average F from the winter fishery (October to March) over the last five years averaged 180% of F_{MSY}, and F from the summer fishery equaled F_{MSY}. However, the production model also indicates that the stock has the ability to quickly rebuild from low stock sizes. Length based analyses indicated that fully-recruited fishing mortality is greater than F_{max} and stock biomass is among the lowest in the assessment time series (1987-1998). Recent survey indices of recruitment are well below average.

The new requirements of the SFA requires the Council to take remedial action to rebuild the stock to a level which will produce MSY (B_{msy}) given the status determination that *Loligo* is approaching an overfished state. The control rule in Amendment 8 specifies that the target fishing mortality rate must be reduced to zero if biomass falls below 50% of B_{msy}. The target fishing mortality rate increases linearly to 75% of F_{msy} as biomass increases to B_{msy}. However, projections made in SAW 29 indicate that the control rule appears to be overly conservative. Projections from SAW 29 indicate that the *Loligo* biomass can be rebuilt to levels approximating B_{msy} in three years if fishing mortality is reduced to the target mortality rate specified in Amendment 8 of 75% of F_{msy}. The yield associated with this fishing mortality rate (75% of F_{msy}) in 2000, assuming status quo F in 1999, was estimated to be 11,732 mt in SAW 29. The current regulations still specify MAX OY as the yield associated F_{max} or 26,000 mt. In determining the specification of ABC for the year 2000, the Council considered offered by SAW 29 which indicated that the control rule adopted in Amendment 8 was too conservative. Model projections presented in the most recent assessment demonstrated that the stock could be rebuilt in a relatively short period of, even at fishing mortality rates approaching F_{msy}. Based on the SAW 29 projections, the Council chose to specify ABC as the yield associated with 90% F_{msy} 13,000 mt. The 2000 specification of ABC for *Loligo* will not result in any negative impacts on other fisheries. The commercial fishery for *Loligo* is primarily prosecuted with otter trawls and often harvests a mixed fishery, including *Loligo* squid, scup, black sea bass, summer flounder, Atlantic mackerel and silver hake. Given the mixed fishery nature of the *Loligo* fishery, incidental catch of other species does occur. Because these measures would result in a reduction of effort in the *Loligo* fishery, the incidental catch rates of other species should also decrease.

As noted above, Amendment 8 to the Atlantic Mackerel, Squid, and Butterfish Fishery Management (FMP) was developed to bring the FMP into compliance with the Sustainable Fisheries Act (SFA). The overfishing definition for *Illex* was revised in Amendment 8 to comply with the SFA as follows: overfishing for *Illex* will be defined to occur when the catch associated with a threshold fishing mortality rate of F_{MSY} is exceeded. Annual quotas will be specified which correspond to a target fishing mortality rate of 75% of F_{MSY}. Maximum OY will be specified as the catch associated with a fishing mortality rate of F_{MSY}. In addition, the biomass target is specified to equal B_{MSY}. The minimum biomass threshold is specified as ½ B_{MSY}.

The most recent assessment of the *Illex* stock (SAW 29) concluded that the stock is not in an overfished condition and that overfishing is not occurring (NMFS 1999). However, due to a lack of adequate data, an the estimate of yield at F_{msy} was not updated in SAW 29. However, an upper bound on annual fishing mortality was computed for the US EEZ portion of the stock based on a model which incorporated weekly landings and relative fishing effort and mean squid weights during 1994-1998. These estimates of F were well below the biological reference points. Current absolute stock size is unknown and no stock projections were done in SAW 29.

Since data limitations did not allow an update of yield estimates at the threshold and target fishing mortality rates, the Council recommends that the specification of MAX OY and ABC be specified at 24,000 mt (yield associated with F_{msy}). Under this option, the directed fishery for *Illex* would remain open until 95% of ABC is taken. When 95% of ABC is taken, the directed fishery will be closed and a 5,000 pound trip limit will remain in effect for the remainder of the fishing year.

8.3 Ecology of the stocks

Ecological relationships were discussed in length in the original Fishery Management Plan for the Squid Fishery of the Northwest Atlantic Ocean. These are summarized below.

8.3.1 Prey and Predator Relationships

Known predators of *Illex* are the fourspot flounder, goosefish, and swordfish. *Illex* is probably eaten by a substantially greater number of fish, however, partially digested animals are often difficult to identify and are simply recorded as squid remains, with no reference to the species. There are at least 47 other species of fish that are known to eat "squid".

Bluefish, sea ravens, spiny dogfish, and the Atlantic angel shark are known to be major predators of the longfin squid. The fourspot flounder, witch flounder, roughtail stingray, and the white hake are also known to prey on *Loligo*. In man cases, squid remains in the stomach of fish are only identified as "squid" with no reference to the species. It is likely that some of these animals are *Loligo* and there are at least 42 other species of "squid"-eating fish in addition to thos identified above. Food habits of squid are difficult to quantify because the squid do not swallow their prey whole. The are known to prey on other squid, fish, and crustaceans such as krill.

8.4 Economic and Social Environment

Unlike Atlantic mackerel, the squid fisheries do not have a recreational component. However, *Illex* squid is a popular form of bait for several recreational fisheries. Impacts to the abundance, availability, and demand for *Illex* will cause indirect but real costs and benefits to the recreational sector depending upon the effects of these parameters on the price of *Illex*.

Increased ability to export domestic squid has caused an expansion of U.S. processing and harvesting of squids. Amendment 5 eliminated the possibility of JV or TALFF for both species of squid since both fisheries are fully utilized the US fishing fleet. The annual quotas specified for 2000 set the annual harvest of both squid species at levels whicl will prevent overfishing and, in the case of Loligo, rebuild the stock to B_{msy}. Based on the modeling results and subsequent recommendations of SAW-29, allowing the domestic fishery to develop and expand any further could be deleterious to both the stock and the fishery.

8.5 Other Management Actions: Adjustment of Minimum Mesh Language for *Loligo*

Amendment 5 to the Atlantic Mackerel, Squid and Butterfish FMP established a minimum mesh requirement of 1 7/8" for owners or operators of vessels possessing *Loligo* squid. Amendment 5 also established the minimum mesh provision for *Loligo* as a measure which can be reconsidered by the Council on an annual basis as part of the annual specification process. For 2000, the Council has chosen to modify to the mesh requirement for *Loligo* as follows:

"The inside webbing of the codend shall be the same circumference or less than the outside webbing (strenghtener). In addition, the inside webbing shall not be more than two feet longer than the outside webbing". The addition of this language should greatly improve enforcement of the mesh requirements in the *Loligo* fishery.

8.6 Alternative Actions

There were two alternative actions for the squid specifications which are considered in this environmental analysis as follows:

(1) For *Loligo*, Max OY at 26,000 MT and ABC, and IOY, DAH, DAP of 11,700 mt

(2) For *Illex*, Max OY at 30,000 MT and ABC, IOY, DAH, DAP of 30,000 mt

8.6.1 Impacts of the proposed action on the environment

8.6.2 Impact of the IOY

The proposed IOY specifications for the 2000 squid fisheries are 24,000 MT for Illex and 13,000 MT for Loligo . Rece increases in the domestic harvest of these species reflect enhanced economic opportunities emanating from the shortage of supply of *Illex* and *Loligo* in the world market.

The removal of 24,000 MT of Illex and 13,000 MT of *Loligo* will have no significant effect on the abundance of these stocks. The Max OY of 24,000 MT for *Illex* is a conservative estimate of optimum yield based the recommendations c SAW-29. The Max OY of 26,000 MT of *Loligo* equals the MSY proxy for the fishery based on the assumption that *Loligo* live only one year from SAW-21.

8.6.3 Impact of Other Management Actions: Adjustment of Minimum Mesh Language for *Loligo*

In addition to the quota specifications summarized above, the Council also recommends additional language be added to the regulations pertaining to gear requirements in the *Loligo* fishery. Industry members testified that some fishermen may be rigging the inner portion of the codends used in the *Loligo* fishery in such a manner that alters the intended selective properties of the regulated mesh size by using an inner codend of substantially greater circumference than the outer portion of the codend (i.e., the strenghtener). The Council proposes to remedy this situation by adding the following language to the *Loligo* mesh restriction section of the regulations governing the *Loligo* fishery: "The inside webbing of the codend shall be the same circumference or less than the outside webbing (strenghtener). In addition, the inside webbing shall not be more than two feet longer than the outside webbing". The addition of this language should greatly improve enforcement of the mesh requirements in the *Loligo* fishery.

8.7 Impacts of the Alternative Actions

8.7.1 For *Loligo*, MAX OY of 26,000 mt and ABC, IOY, DAH, DAP of 11,700 mt

TABLE 4. ALTERNATIVE FINAL INITIAL ANNUAL SPECIFICATIONS FOR THE ATLANTIC SQUID AND BUTTERFISH FOR THE FISHING YEAR, JANUARY 1 THROUGH DECEMBER 31, 2000, (in metric tons (mt)).

Specifications	Squid		Butterfish
	Loligo	Illex	
Max OY	26,000	30,000	16,000
ABC[2]	11,700	30,000	10,000
IOY	11,700	30,000	10,000
DAH	11,700	30,000	10,000
DAP	11,700	30,000	10,000
JVP	0	0	0
TALFF	0	0	0

The specifications of 26,000 mt for ABC, IOY, DAH and DAP for the *Loligo* fishery may cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for *Loligo* using recently developed information on the age and growth of *Loligo* using daily statolith growth increments. These finding indicate that *Loligo* is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three years. As a result, real-time assessment/management system will be needed to attain full exploitation of the stocks while, at the same time, ensuring that adequate levels of spawning stock are maintained. Amendment 6 to the FMP established a new definition of overfishing for *Loligo* (F_{max}) and also recommended that annual quotas be specified at target fishing mortality rate of F_{50}. If ABC, IOY, DAH and DAP were all specified at the overfishing threshold (F_{max}) th the Council would not be implementing the FMP according to the most recent Amendment. Moreover, the risk of overfishing the stock would be greatly increased since there would be no buffer between the annual quota level and th overfishing threshold level. This problem would be more acute if discarding of *Loligo* was significant.

8.7.2 <u>For *Illex*, 30,000 MT of ABC, IOY, DAH, DAP</u>

The specifications of 30,000 mt for Max OY, ABC, IOY, DAH and DAP for the *Illex* fishery may cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for *Illex* usin recently developed information on the age and growth of *Illex* using daily statolith growth increments. These findings indicate that *Illex* is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three year As a result the biological reference points for *Illex* were re-estimated in SAW-21. The Council recently developed Amendments 6 and 8 to the FMP which incorporated the recommendations of SAW- 21 in the development of a new definition of overfishing for *Illex* and also recommended that overfishing be defined to occur when fishing mortality exceeds F_{msy}. The current estimate of yield at F_{msy} equals 24,000 mt. If ABC, IOY, DAH and DAP were all specified a level above that associated with the overfishing threshold (F_{msy}), then the Council would not be implementing the FMP according to the most recent Amendment . In addition, SAW-21 advised that catches in excess of 24,000 mt may onl be attainable in years of high abundance.

9.0 Butterfish

The proposed initial specifications for the 2000 Atlantic butterfish fishery are contained in Table 3. The 2000 quota specifications for butterfish remain the same as those specified in 1998 and 1999.

9.1 Description of the Fisheries

Atlantic butterfish were landed exclusively by US fishermen from the late 1800's (when formal record keeping began) until 1962. Reported landings averaged about 3,000 mt from 1920-1962. Beginning in 1963, vessels from Japan, Poland and the USSR began to exploit butterfish along the edge of the continental shelf during the late-autumn throug early spring. Reported foreign catches of butterfish increased from 750 mt in 1965 to 15,000 mt in 1969, and then to about 18,000 mt in 1973. With the advent of extended jurisdiction in US waters, reported foreign landings declined sharply from 10,353 mt in 1976 to 1,326 mt in 1978. Foreign landings were slowly phased out by 1987.

During the period 1965-1976, US Atlantic butterfish landings averaged 2,051 mt. From 1977-1987, average US landings doubled to 5,252 mt, a historical peak of slightly less than 12,000 mt landed in 1984. Since then US landings have declined sharply to an average of 2,500 mt since 1988. Recent reductions in Japanese demand for butterfish ha probably had a negative effect on butterfish landings.

Butterfish landings totaled 2,700 mt in 1992. Almost half (45%) of the 1992 total came from southern New England waters (Statistical area 53). Two statistical areas, 53 and 61, accounted for over 75% of the 1992 total. About half of the landings occurred during January and February, the remainder being distributed throughout the rest of the year. Butterfish landings were 3631 mt and 2031 mt in 1994 and 1995 , respectively. NMFS weighout data indicate that US butterfish landings increased to 3489 mt in 1996 (valued at $5.1 million) and then decreased to 2,797 mt (valued at $4.7 million) in 1997.

9.2 Status of the Stocks (Report of the Seventeenth Northeast Regional Stock Assessment Workshop)

The SAW 17 Advisory Report included the following concerning the state of the stock:

The Atlantic butterfish stock is at a low to medium biomass level and current catch levels are below the MSY of 16,00 however, exploitation rate is unknown. Although recruitment of butterfish has remained high in recent years, the stocl size of adults has declined since 1990 and is currently well below average. Since 1988, annual butterfish landings hav averaged 2,500 mt, or only 25% of the domestic allowable harvest (DAH) of 10,000 mt. Landings in 1993 are project to be 3,000 mt. Survey biomass indices in autumn 1992 and spring 1993 were among the lowest in the survey time series. Fishing effort increased in 1992 but, overall, has been relatively stable since 1984. Commercial landings per unit of effort (LPUE) in 1992 remained at the low levels observed since 1988.

SAW 17 offered the following management advice:

Butterfish landings in recent years have been well below historical average yields. Japanese demand for butterfish ha waned and this has had a negative impact on harvest levels. Butterfish landings are thus unlikely to increase unless market demand improves. If demand does improve, however, the stock in its current condition may not be able to sustain landings in excess of the long term historical average (1965-1992) of 7,200 mt because of recent declines in abundance as indicated by survey indices.

Historical information suggests that discarding of butterfish may be an important source of fishing-induced mortality. The SARC recommended that data be collected that would allow discard levels to be reliably estimated.

9.3 Alternative Actions

There were two alternative actions for the butterfish specifications which were considered in this environmental analys as follows:

(1) Specify DAH and OY at MAX OY (16,000 mt).

(2) Specify DAH and OY at 10,000 mt

9.4 Impacts of the proposed action on the environment

No new assessment information exist since SAW-17. Based on the recommendations of SAW-17, ABC should not exceed 7,200 mt. In addition, the Council chose a risk averse approach by setting DAP and DAH at 5,900 mt. This le was chosen because considerable uncertainty exists about the level of discards in the directed fishery. The quota of 5,900 mt was set to allow for discards such that the ABC of 7,200 mt should not be exceeded. TALFF is 0 mt (as it ha been for the last several years). In addition, since TALFF for Atlantic mackerel is specified at zero there is no bycatch TALFF specification necessary for butterfish.

9.5 Impacts of the alternative actions on the environment

9.5.1 Specify DAH and OY at MAX OY (16,000 mt)

The most recent stock assessment advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish higher than these levels wou be deleterious to the stock and the fishery.

9.5.2 Specify DAH and OY at 10,000 mt (1995 specification)

As noted above, the most recent stock assessment for butterfish advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain lev in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish as hig as 10,000 mt would be deleterious to the stock and the fishery.

10.0 Effect on endangered and marine mammals

Amendment 5 to the Atlantic Mackerel, Squid and Butterfish Fishery Management Plan pursuant to Section 7 of the Endangered Species Act of 1973, as amended, concluded that the fishery and management activities regulated by the FMP would have no significant adverse affect on any threatened or endangered species. The proposed specifications do not include measures that change the basis for that determination. The relationships among the proposed specifications and various existing applicable laws and policies are fully described is section 9.3 of Amendment 5. Section 9.3.3.1 of Amendment 5 addressed marine mammals and endangered species. The specifications proposed here are based upon the new definitions of overfishing adopted in Amendment 8. Since the new definitions of overfishing are more conservative than previous Amendments and will result in lower annual quotas relative to previous specifications, the possible interactions with and negative effects on marine mammals should be less than in those analyzed in Amendment 5. By reducing the chance of overfishing of these species, the chances that their populations will be reduced due to fishing will be greatly diminished. This should have a positive effect on marine predators, including whales and dolphins, which depend, in part, on these species as prey. The overall effect on marine mammals should be positive relative to the current specifications.

The foreign mackerel trawl fishery was known to accidentally kill pilot whales, common dolphin, offshore bottlenose dolphin, Atlantic white-sided dolphin, and grampus in their trawling operations. The domestic component of this fisher also takes marine mammals. The June 1991 Draft Legislative Environmental Impact Statement for the Proposed Regime to Govern Interactions Between Marine Mammals and Commercial Fishing Operations determined that the number of marine mammals taken in these fisheries were low in comparison to likely abundance levels. Under the current Marine Mammal Exemption Program, the foreign mackerel trawl fishery is listed as a Category I fishery and th domestic mackerel trawl fishery is listed as a Category II fishery. Fishermen participating in these fisheries must regis for the Exemption Program, keep daily logs of fishing activities and marine mammal interactions, and the foreign fish must take observers when requested.

11.0 Essential Fish Habitat Assessment

Atlantic mackerel, squid and butterfish have EFH designated in many of the same bottom habitats that have been designated as EFH for most of the groundfish within the Northeast Multispecies FMP, including: Atlantic cod, haddock, monkfish, ocean pout, American plaice, pollock, redfish, white hake, windowpane flounder, winter flounder, witch flounder, yellowtail flounder, Atlantic halibut and Atlantic sea scallops. Broadly, EFH is designated as the bottom habitats consisting of varying substrates (depending upon species) within the Gulf of Maine, Georges Bank, and the continental shelf off southern New England and the mid-Atlantic south to Cape Hatteras for the juveniles and adults of these groundfish. In general, these areas are the same as those designated for Atlantic mackerel, squid and butterfish.

Fishing activities for Atlantic mackerel, squid and butterfish occur in these EFH areas. The primary gear utilized to harvest these species is the otter trawl. Since the otter trawl is a bottom- tending mobile gear, it is most likely to be associated with adverse impacts to bottom habitat. The primary impact associated with this type of gear is reduction of habitat complexity (Auster and Langton, 1998).

Amendment 8 included overfishing definitions which are the same or more conservative than overfishing definitions from previous Amendments. As a result, the quota specifications resulting from these new overfishing definitions are the same or lower than in previous years. This should effectively result in the same or reduce gear impacts to bottom habitats by reducing or maintaining the harvest of the managed species within this FMP. Any reductions in harvesting effort may indirectly benefit EFH by creating an overall reduction of disturbance by a gear type that impacts bottom habitats. Other management actions already in place should control redirection of effort into other bottom habitats. Therefore, the Council has determined that the 2000 quota specifications for Atlantic mackerel, squid and butterfish will have no more than minimal adverse impact upon the listed EFH.

12.0 Finding of no significant impact

For the reasons discussed above, it is hereby determined that neither approval and implementation of the proposed action nor the alternative would affect significantly the quality of the human environment, and that the preparation of a environmental impact statement for these specifications is not required by section 101(2)(c) of the National Environmental Policy Act nor its implementing regulations.

______________________ ______
Assistant Administrator for Fisheries, NOAA Date

REGULATORY IMPACT REVIEW FOR THE 2000 CATCH SPECIFICATIONS FOR ATLANTIC MACKEREL, SQUID, AND BUTTERFISH (REVISED 11/10/99)

1. INTRODUCTION

The National Marine Fisheries Service (NMFS) requires the preparation of a Regulatory Impact Review (RIR) for all regulatory actions that either implement a new Fishery Management Plan (FMP) or significantly amend an existing pla or regulation. The RIR is part of the process of preparing and reviewing FMPs and provides a comprehensive review the changes in net economic benefits to society associated with proposed regulatory actions. The analysis also provides a review of the problems and policy objectives prompting the regulatory proposals and an evaluation of the major alternatives that could be used to solve the problems. The purpose of the analysis is to ensure that the regulato agency systematically and comprehensively considers all available alternatives so that the public welfare can be enhanced in the most efficient and cost-effective way.

The RIR addresses many items in the regulatory philosophy and principles of Executive Order (E.O.) 12866. The RIF also serves as the basis for determining whether any proposed regulation is a "significant regulatory action" under certain criteria provided in E.O. 12866.

1.1. Description of User Groups

In order to identify the ports important to fisheries managed by the Mid-Atlantic Council and to identify the fisheries relatively important to those ports, the Council retained Dr. Bonnie J. McCay of Rutgers University to prepare a background document (McCay *et al*. 1993). The research covered ports from Chatham, Massachusetts, to Wanchese, North Carolina. McCay *et al.*1993 is largely based on two data sources. Landing statistics are from the National Marine Fisheries Service. Information about the ports is from interviews with key informants. The quality of the port descriptions, therefore, depends on the information supplied by the informants. The following port descriptions are taken from McCay *et al*. 1993 The port descriptions are brief summaries of the material in McCay *et al*. 1993 and readers with questions are encouraged to obtain the original document.

For purposes of orientation, Barnstable County, MA includes all of Cape Cod, including the fishing port of Chatham. New Bedford is located in Bristol County, MA. The port of Newport is located in Newport County, RI. Galilee is located in Washington County, RI. Stonington is located in New London County, CT. Greenport, Shinnecock/Hampton Bays, and Montauk are located in Suffolk County, NY. Freeport is located in Nassau County, NY. Brooklyn is located in Kings County, NY. Ocean City is located in Worcester County, MD. Virginia has a system whereby certain cities exist apart from counties. Within the scope of this analysis, Hampton, Norfolk, Newport News and Virginia Beach all fall into this category. Wanchese is located in Dare County, NC.

Chatham, Massachusetts

The total landed value of fish in Chatham in 1992 was around $11 million. Groundfish and shellfish --bay scallops, quahogs, and mussels-- comprise the majority of the landed value for Chatham, accounting for over 80% of the landed value. *Loligo* accounted for 2.38% of landed value in 1992, harvested by pound-nets (65%) and fish pots (37%).

Atlantic mackerel accounted for 0.45%, caught by fish pots (77%), draggers (5%), and sink gill nets (4.6%). Pound nets and fish pots or traps accounted for only 4.6% of the total landed value of species in Chatham in 1992. However, *Loligo* accounted for 31% of the fish pot value and 86% of the pound net revenue. Atlantic mackerel accounted for 12% of the fish pot value and 3% of the pound net revenue. Butterfish accounted for 0.33% of the fish pot value and 0.20% of the pound net revenue.

New Bedford, Massachusetts

The squids, mackerel, and butterfish are not important to New Bedford. *Loligo* squid made up 0.05% of the total landed value for New Bedford in 1992. The other species covered by this FMP accounted for less than 0.01%.

Loligo is caught during the spring months of April and May by inshore boats in Nantucket Sound, and more boats are now fishing for *Loligo* offshore, reported a New Bedford port agent. Even into late fall, he said, boats are targeting squid offshore. New Bedford's *Loligo* fleet are those that summer flounder during the summer. They target squid during the spring and fall when they are not going for summer flounder. The port agent reported that some of the small boats offload at sea to freezer boats from Rhode Island.

Newport, Rhode Island

Within Newport, there are three commercial fishing packing and distributing businesses. One mainly deals with draggers, gillnetters, and some scallopers, and brings in a great deal of groundfish. Another is a lobster house, but they also handle the trappers. There is also a trap company located in Newport. Species caught in traps are discussed below. The dealer that handles mostly draggers packs and distributes the majority of species of important to this study. The trap company also deals with these species but not in as large of quantities.

Approximately 15 large draggers were tied up at the fish house that deals with draggers during a recent visit (1992) to Newport. The fish house owner, the local port agent, and fishermen spoken with on this day said that having 15 boats in port at the same time was unusual, and had to do with a storm moving through the area. Most of the boats that offload at the Newport fish house are not from Newport. They are from other ports such as New Bedford, various Long Island ports, Cape May, and Pt. Judith. These boats are going primarily for squid at the time of our visit, which was in December. This particular fish house owner does not own any of the boats that offload at his dock.

The fishermen who make up the crews in Newport are not necessarily from Newport, but some local people from the area do work on the boats. Some crew members come from Point Judith, New Jersey, New York, and New Bedford. Typically, the owners of the boats do not work the boats. Often the owners used to fish but do not anymore. As with almost all of the ports, crews are paid on the share system.

The total value of landings in Newport for 1992 was $14.5 million. Lobster ranked first, accounting for 44% of landed value. *Loligo* ranked sixth.

Other Washington County Communities, RI (including Quonset Point)

The value of the landings at Other Washington County communities including Quonset Point in 1992 was around $20 million.

Other Washington County including Quonset Point includes both traditional and innovative fisheries. Processing facilities for squid in the region have resulted in the dominance of both *Loligo* and *Illex* squid in terms of landed value, but lobster and bay quahogging and oystering remain important, as well as other inshore activities such as eel potting, trapping striped bass, and an unusual spear fishery for tautog (blackfish). There is some handlining for bluefin tuna and trolling for inshore species such as striped bass and summer flounder as well as yellowfin tuna.

Atlantic mackerel, butterfish, scup, summer flounder, and angler are among the top ten species landed by value, and they figure importantly in the catch of the otter trawl vessels. The gillnet fishery for cod and tautog includes a small amount of angler and Atlantic mackerel. The fish pots are predominantly for scup, but some black sea bass, summer flounder, bluefish, and *Loligo* squid are caught in them too.

Virtually all of the angler, butterfish, weakfish, Atlantic mackerel, and squid landed here are brought in by draggers.

A major fishing location in Washington County is located at Quonset Point, an abandoned Navy Base which houses several isolated industrial developments, including a major offloading facility for car imports. As for commercial fishing, Quonset Point is port to five factory trawlers, two of which are from Rhode Island and three from Portland, Maine. The five trawlers range in length from 117 ft. to 155 ft., and they can hold 4 to 5 hundred thousand lbs. of frozen product per trip. This contrasts with wet boats which have a 150,00 thousand lb. capacity. The Rhode Island boats are owned by the president of a service and sales facility located at Quonset Point. The other three boats are owned by a man from Portland, Maine.

The service and sales facility located at Quonset Point started out with one boat about seven to eight years ago. The two boats owned by the president of the facility at Quonset Point were built specifically as freezer boats.

These boats take one to two week trips. The three boats from Maine are converted supply boats and they may stay out as long as thirty days on some trips.

On occasion, the freezer trawlers engage in joint ventures with American boats. The smaller boats will fish and offload onto the freezer boats. The freezer boats have also in the past participated in joint ventures with Russian, Dutch and Polish boats.

The freezer boats target *Loligo* squid, *Illex* squid, butterfish, mackerel, whiting and sometimes scup. They may target herring but not normally.

The *Illex* squid season lasts from June to October, and the freezer boats average 12 day trips when they are working *Illex*. November to May is the *Loligo* season, and the trawlers average 30 days out while they are targeting *Loligo*. Mackerel is caught from December to April.

The freezer trawlers do not have any significant landings of butterfish. Butterfish is available year round, but they are only desirable from December to February because of their fat content.

The Quonset Point boats will fish from North Carolina up to the Canadian border although they rarely go that far north. They fish for *Illex* up to 600 ft (100 fathoms) off the coast of New Jersey. *Loligo* fishing is mostly done around Hudson Canyon and Block Canyon.

The fish is packaged on the boats in plastic bags and placed in aluminum trays. Fiberboard boxes are also used. The boxes hold approximately 27 to 28 pounds of fish and one boat can hold approximately 13,000 boxes, or 360,000 pounds of fish.

The freezer trawlers are at sea 280 days per year. October and May are the slow months. During this time, the crew works on boat maintenance and painting.

In 1992, the average cost of operating one of these boats for two years was $2,200,000, which covered fuel, maintenance, repairs and nets.

The Rhode Island boats have from 9 to 11 crew members plus a captain and all of these crew are from the local area. The service and sales facility at Quonset Point employs twenty-two persons apart from the crews. This number includes office personnel and `lumpers' who unload the boats.
Crew size increases during the *Loligo* squid season. During *Loligo* season the crew sorts the squid into six sizes and also sorts through the bycatch. *Illex* squid catches are much cleaner and do not require sorting through bycatch.

The crews are full-time workers and are paid on a share system. Individuals can make from $40,000 to $60,000 annually. Fuel costs comes off the top of the boat's catch. The boat takes about 52 or 58 percent and the crew takes about 42 or 48 percent. Food comes from the crew share.

Point Judith, RI

Point Judith is almost exclusively a fishing community, having a core group of fishermen who fish full-time. During the summers, the streets are filled with tourists coming or going on the Block Island ferry. Yet there is little for tourists to do in Point Judith. The town does not have the condominiums, shops, and hotels that other ports such as Chatham, Newport, and Montauk have. Only one hotel stands out in Point Judith, the Dutch Inn, which is circa 1960. The few restaurants, shops, and tourist venues, such as fudge shops, are enough to take care of the summer onslaught of ferry passengers and the year round working population centered around commercial fishing.

The total value of fish landed in Point Judith in 1992 was $36.5 million. The top ten species by percent landed value in 1992 were lobster, *Loligo* squid (15%), angler, summer flounder, scup, butterfish (4%), winter flounder, yellowtail, and cod. Mackerel accounted for 1%.

Point Judith has a large fleet of trawlers, gillnetters, and lobster boats. While estimates vary, approximately 200 commercial boats dock in Point Judith, including 80 trawlers, 30 gillnetters, and 100 or so lobster boats.

One informant described Point Judith boats as diverse in their annual round and approach to the fisheries, as opposed to New Bedford boats which only go after groundfish. Point Judith boats which are not diverse are the freezer boats which only target fish for frozen markets -- the squids, butterfish, and mackerel. The diverse approach to fisheries combined with full-time experienced fishermen means the fishermen are fishing year round even if they may switch fisheries and boats during the year.

Stonington, Connecticut

The Long Island sound and its estuaries and rivers are the major foci of Connecticut fisheries. There is a small traditional haul seine fishery for alewives and other fishes (unspecified, for "industrial" uses). Dip-nets are used for blue crabs (and a few alewives). Drift gillnets are used for menhaden, bluefish, weakfish, black sea bass, alewife, Atlantic mackerel, and other species. There is a specialized drift gillnet fishery for American shad. Quahogs (hard clams) are very important, and over 70% of Connecticut's landed value comes from oysters cultivated in Long Island Sound. Second to oysters are lobsters, most of which are caught inshore in the sound. Third in value is a mixed species otter trawl fishery, most of which is based in the port of Stonington.

Stonington is the primary port in Connecticut. The main fishing fleet is out of Stonington. Stonington is the only off-shore port with a fleet consisting of trawlers, lobster boats, and ocean scallopers. People are mostly going for groundfish such as cod, haddock, and flounder.

Atlantic mackerel is seldom targeted because there is no market for it in Stonington. Atlantic mackerel accounts for 0.01% of the landed value of species and these are caught primarily by drift gillnets. One vessel specializes in *Loligo* squid. Other vessels will target squid when they appear in large numbers. *Illex* squid is seldom targeted because the market is limited since the *Illex* squid spoils rapidly. There is a market for butterfish but no vessel is specialized in catching it.

The major species of fish caught in Stonington are flounder, summer flounder, squid, whiting, and some codfish during the winter months. Over the past five years (1988-1993), the fishermen have caught an increasing number of monkfish. The three large scallop boats have landed the majority of the monkfish.

In the past, summer flounder was the most important species caught by fishermen in Stonington. However, squid is increasing in importance as a result of the summer flounder quotas. During the summer of 1993, one boat attempted to specialize in dogfish but he discontinued this.

Freeport/Brooklyn area, NY

Freeport has 71 permitted vessels and Brooklyn has 33.

The total value of all species landed in the Freeport/Brooklyn area in 1992 was about $4 million. The most important fisheries in terms of landed value are surf clam (45%), *Loligo* squid (13%), summer flounder (11%), scup (10%), and lobster (6%). Butterfish accounted for 0.52% and mackerel 0.31%.

Bottom otter trawlers (48%) and surf clam dredges (45%) accounted for the majority of the landed value of species in the Freeport/Brooklyn area in 1992.

Belford, Point Pleasant, and Barnegat Light, New Jersey

Belford has 32 core boats in its port. The fleet is pretty much in the 40-60 foot range and made up of older boats. Draggers, poundnetters, and lobsterpotters make up the majority of the Belford fishing boats. Belford remains a family based fishing port. The Belford Seafood Co-op is the fish house for Belford.

Long Beach Island has a core of 30 steady boats that either longline, bottom trawl line, scallop, or gillnet. The gillnet boats are small, in the 30-45 foot range, but the vessel size in the fleet goes up to 100 foot scallop boats. The fleet remains a family based fleet, and the number of boats has remained constant over the years. Two docks pack fish in Long Beach, and there is an office for a swordfish and tuna dealer which purchases fish from the boats and has an offloading facility in Point Pleasant.

Point Pleasant is the largest of these three ports and arguably the most diverse. There are 51 core boats at Point Pleasant. They run the gamut from inshore gillnetters to scallop boats, draggers, longliners and lobster potters.

For the most part, all boats in these three ports are owner operated. There are no freezer boats in any of these ports. Whiting is an important species at all the ports. It was the mainstay of the fisheries in the 1970s and 1980s but has declined. Some Jersey fishermen are suggesting that Rhode Island boats are catching much of the whiting before they migrate to their winter grounds off of New Jersey.

Belford, NJ

The total landed value for Belford in 1992 was about $9.2 million. In recent years, ocean quahog vessels have moved to the port of Belford, with the result that the landed value for the port is now dominated by ocean quahogs (32% in 1992). Excluding ocean quahogs from the data, lobster is the most valuable (46% of landed value in 1992), followed by blue crab, summer flounder, menhaden, silver hake, and *Loligo* squid (4%). Excluding ocean quahogs from the data, butterfish accounted for 0.90% and mackerel 0.46% of the 1992 landed value.

The otter trawl accounts for 19% of the total landed value (much higher if ocean quahog dredges were not included). The species composition of otter trawl catches varies seasonally and over the years. In 1992 it was dominated by summer flounder (26%), silver hake (22.5%), *Loligo* squid (14%), winter flounder (11%), and scup (9.3%).

Point Pleasant, NJ

The town of Point Pleasant is located at the mouth of the Manasquan inlet in Ocean County. The town's economy is geared towards the summer tourist and recreational economy. The commercial, party/charter boat, and recreational fishing industries are very important to the local economy, employing many of the local residents and supporting many related industries, such as seafood markets, restaurants, marine supply houses, welders and salvage, and many of the tourist oriented industries.

For the ocean and bay fisheries of Point Pleasant, the entire landed value was about $16,000,000. The major species landed in 1992 (by percentage of landed value) were ocean quahog (38%), sea scallops (12%), surf clam (12%), *Loligo* squid (8%), and hard clam (6%). Butterfish accounted for 0.31% and mackerel 0.23%.

Loligo squid is caught in the winter, often mixed with whiting. In 1992, *Loligo* usurped silver hake's position as the most valuable species caught by the trawlers, and it now accounts for about 49% of the landed value of the trawlers from Point Pleasant. At first, it was caught as a bycatch by those seeking silver hake in the Gully. Now it is targeted by a few of the trawler captains. As one trawler captain stated, "You can't help but target squid sometimes, there is so much out there". Thus, the change to *Loligo* was initially de facto, but now it is by choice.

Butterfish are caught with *Loligo* squid. If mixed with too much squid they are unmarketable. However, in general they are a somewhat marketable fish. That which is not marketable is sometimes consumed by the crew of the vessel.

In 1992 bottom fish otter trawl accounted for 15.73% of the total landed value for the Point

Pleasant area. Major species caught include *Loligo* squid (50%), silver hake (21%), summer flounder (8%), and scup (4%). Butterfish contributed 1.76% and mackerel 1.40% in 1992.

Barnegat Light/Long Beach Island, NJ

The community of Barnegat Light is located on Long Beach Island, a barrier island along the New Jersey shore. The island up to and including Barnegat Light is intensely developed with summer and beach/boarding houses, and much of the community is heavily geared toward the summer beach economy. During the winter, Barnegat Light's economy slows significantly, and one of the major forms of employment becomes commercial fishing. It hires 150 people working on docks and is one of the biggest income generating businesses on the island during the winter.

The larger region, including Barnegat Bay ports, had landings worth about $32 million in 1992. Major species, by percent of the landed value (excluding surf clams and ocean quahogs) were: sea scallops (28%), hard clams (17%), swordfish (13%), tuna (17%), and tilefish (8%). Butterfish accounted for 0.05%.

Cape May, NJ

Cape May is the most southerly town in New Jersey. The town is noted for its tremendous tourist and beach economy during the summer. While there are marinas in the town, there is little conflict for space with the commercial fishermen because the commercial docks are separated from the rest of the community.

Along one stretch of road lies most of the commercial fishing docks in the town. These include a surf clam dock and three commercial finfish docks.

All told, there are 33 local draggers operating from Cape May docks, most of which are wet boats. There are some equipped with refrigerated sea water (RSW) capacity and seven boats with flash freezers. Many transient boats (57 in 1992) land in the Cape May/Wildwood area from places like Pt. Pleasant. and Port Judith, especially to take advantage of winter stocks of *Loligo* squid and to find safe harbor during storms.

For the Cape May/Wildwood area, the entire landed value for 1992 was about $37 million. Cape May landed about $30.4 million, Wildwood landed $4.5 million, and other ports in the Cape May area landed $2.3 million. Major species landed include sea scallops (28%), ocean quahog (11%), *Illex* squid (10%), *Loligo* squid (9%), and surf clams (8%). Mackerel contributed 1.56% and butterfish 0.62% in 1992. Other ports in this area and the statistics that follow include Cold Spring Harbor, near Cape May, and Sea Isle City, to the north. There are now two tilefish boats, two fish trap (pot) boats and one dragger working out of Sea Isle City, and tilefish and black sea bass are the species targeted.

Tilefish are not landed, except in Sea Isle City. Scup are targeted by draggers. Black sea bass are caught by pot boats and some draggers. Fluke are targeted by draggers. Dogfish are caught by gillnetters in November, December and in the spring at which time they switch from the spiny dogfish to the smooth dogfish. Draggers target dogfish in the early winter months. Some draggers may just catch them if they happen to run into them. Atlantic mackerel are targeted by draggers in the winter. *Loligo* squid is almost a year round fishery for draggers, but they may be going for either squid on a trip. *Illex* squid is caught by draggers from May to October. Butterfish are a bycatch of squid and are rarely targeted. Gillnetters catch weakfish but there aren't many doing

this any more because of state regulations, so there is a drop in these landings. Draggers also target weakfish. Bluefish are caught by gillnetters and they are a bycatch for draggers.

Together with bottom sea scallop trawling, bottom fish otter trawling accounts for 39.33% of the total landed value of the Cape May/Wildwood area. Major species caught by bottom fish otter trawl are *Illex* squid, *Loligo* squid, summer flounder, and scup.

Loligo squid is targeted during the winter by the freezer trawlers. It is one of the largest landings and money makers, accounting for about 25% of the total landed value of all bottom fish otter trawl. The squid are hauled aboard and flash frozen into blocks of ice and kept in cold storage until they can be returned to port. The demand for *Loligo* squid is largely for an export market in flash frozen squid. They also market the squid to a lesser extent in the fresh fish markets in New York and Philadelphia. The domestic and foreign markets are growing slowly.

Illex squid is the largest summer fishery for the freezer trawlers. It is a relatively recent fishery because *Illex* is decomposes at higher temperatures. To handle large volumes of *Illex* it is necessary to have RSW capacity, and it is preferable to have flash freezers to ensure a better product. *Illex* is the biggest fishery for the bottom fish trawlers from Cape May, accounting for 27% of the total landed value of the gear in 1992. The market for *Illex* is predominantly aimed at Europe for flash frozen product. However, there is a growing market for processed *Illex* rings in the United States.

Butterfish is sometimes landed with squid. When mixed with large amounts of squid, it is unmarketable and is sometimes consumed by the captain and crew of the vessel. However, it is sometimes landed in appreciable quantities and can be marketed.

Although Atlantic mackerel is a low valued fish at Cape May, it is caught in substantial numbers and its value does increase under certain conditions. For example, a recent joint venture with the Russians allowed for an increased value in Atlantic mackerel landings in two ways. First, it increased the landings of Atlantic mackerel. Second, it opened a new market for the boats to sell their catch.

Atlantic City, NJ

Atlantic City's port is primarily clam boats. However it also has four boats potting for black sea bass year round. These are small boats between 34 and 40 ft. They could sea bass pot year round but the catch is higher from the spring to late fall. There is some gillnetting here for weakfish and bluefish in the spring and fall, but this is decreasing. One fishermen comes here from Barnegat Light every year to gillnet for sturgeon.

Shark River, NJ

Shark River, in Monmouth County, is a small port dominated by charter and party boats and private recreational boats. It has also been an important lobstering port and has had some gillnetting and dragging, as well.

Highlands & Atlantic Highlands, NJ

These Monmouth County ports are close to Sandy Hook; Atlantic Highlands is a sports fishing center. Highlands has sports fishing but also a small amount of lobstering and other fishing and -- together with Seabright -- an important bay fishery for hard clam sand soft clams.

Port Norris & other Cumberland County ports, NJ

Port Norris and other Cumberland County ports fringe the Delaware Bay and were traditionally the center of oystering. Oystering is negligible because of oyster diseases. Gillnetting and sports fishing for weakfish and other species, as well as blue crab potting, are becoming very important.

Ocean City, Maryland

Ocean City is currently the primary port for ocean fishing vessels in Maryland. Its boats are primarily smaller boats; they are either inshore boats or small trawler, day boats. Its harbor area is directly west of the inlet at the southern end of the city and is one and a quarter miles from the ocean.

The total landed value of fish and shellfish in Ocean City and environs in 1992 was about $8 million. The surf clam and ocean quahog fishery represented 62% of that total. Summer flounder (5%), black sea bass (5%), and butterfish (0.35%) are among the species of concern that are relatively important to the fisheries. As elsewhere in the region, the actual number of species landed and sold is extremely high: (70 species).

After the clam dredge, the most important gear type in terms of landed value was the pelagic longline (12.35%), closely followed by the otter trawl dragger (11.9%).

The trawlers (there are about six to ten of them here) are the larger boats of the port, ranging in size from 62 ft and 32 tons to 73 ft and 103 tons. None of the boats in Ocean City have refrigerated sea water. They chill the fish in ice salt water in barrels on the deck. The Ocean City draggers take a large variety of finfishes, topped by summer flounder (50%) and spiny dogfish (27.6%) in 1992. Horseshoe crabs make up an unusually large component of this catch, followed closely by weakfish. Black sea bass, butterfish, scup, *Loligo* squid, and Atlantic mackerel are of some importance.

Hampton Roads/Hampton, Virginia

Ninety-five different species were landed in the Hampton Roads area in 1992. Sea scallops (63%) and summer flounder (17%) were the two most important species in the Hampton Roads area in terms of landed value in 1992. Substantial quantities of *Loligo*, *Illex*, and mackerel were landed, but the quantities may not be reported because of data confidentiality constraints. Butterfish accounted for 0.03% of the value in 1992.

Scallop dredges (54%) and otter trawlers (20%) are the most important gear types in terms of landed value in Hampton Roads.

Atlantic mackerel, *Loligo* squid and *Illex* squid are discussed together in this section because there is one boat that lands in Hampton Roads and in Cape May that targets these three species. This fisherman is targeting *Loligo* now (Nov.-Dec.1993) and it is bringing a good price. This fisherman targets *Illex* squid during the summer. *Illex* squid does not bring as high a price but is abundant. Atlantic mackerel pass through the waters in the Hampton Roads area from about January to about February or March and this fisherman will use a midwater trawl to catch them. One informant referred to this as a high rise net used for mackerel and squid. This fisherman mostly fishes between Wachapreague, VA and Ocean City, MD. Charter boat captains often buy some of the squid for bait.

One informant said that *Loligo* squid used to be a bycatch with summer flounder with otter trawlers but no more because the larger net mesh used to catch summer flounder is too large to catch the squid.

Atlantic mackerel is caught primarily by draggers. A small amount are also caught by sink gill nets and pound nets. One informant said that fishermen used to catch it in February but the water is too warm for the mackerel now (1993). According to one informant, all of the fishermen will catch Atlantic mackerel if they are in the waters close to Hampton Roads but in the past few years the water has been too warm. One fisherman said, "It's good fishing when mackerel are here." Party boats especially like to go out for mackerel. Fishermen used to get 50-60 cents per pound for the Atlantic mackerel. "Unless it gets cold we won't see them this year."

Butterfish were 0.03% of the total 1992 landed value in Hampton Roads. Draggers land 57% of this catch and sink gill netters land 34%. Butterfish were 0.82% of the 1992 landed value for pound netters. Butterfish is an incidental catch to squid. Some fishermen in Hampton Roads catch both long butterfish and star butterfish (more diamond shaped with high dorsal fin and long pectoral fin). The star butterfish brings a higher price. These are caught with draggers and pound nets. The pound net fishery catches them primarily in July, August and September.

Wanchese, North Carolina

Wanchese is located on the southern end of Roanoke Island in North Carolina. Wanchese has traditionally been a fishing community with commercial fishing operations since the late 1800's. Many of the current residents of Wanchese are descendants of people who settled here in the late 1600's and early 1700's.

Wanchese is bounded on three sides by estuarine waters and is twenty minutes (by boat) from Oregon Inlet. Thus it is a convenient location for inshore and offshore boats. However, Oregon Inlet is sometimes impassable for the larger trawler boats and many of these boats from Wanchese will stay in Hampton, Virginia or New Bedford, Massachusetts during the winter months. Wanchese is also the site of the Wanchese Seafood Industrial Park (WSIP) which was developed in the 1970s to be a major site for seafood processing activities. However, because of the uncertain nature of Oregon Inlet and the general decline in fisheries since the 1970s, very few businesses actually operate at the WSIP.

Summer flounder (21%) were the most important species in Dare County in 1991 in terms of landed value. In 1991 the value of all species landed in Dare County was over $11 million. Blue crabs (hard) are second in importance (11%), followed by weakfish (9%). Other species of interest landed in Dare County in 1991 were bluefish (4.02%), sea basses (3.41%), dogfish (1.00%), tilefish (0.53%), scup (0.41%), butterfish (0.31%), squid (0.29%), and Atlantic mackerel (0.12%).

The total landed value for the following species was $4,763,534 in 1992 (USDC 1993b): summer flounder, black sea bass, Atlantic mackerel, scup, weakfish, squids, tilefish, sharks/dogfish uncl., butterfish, bluefish, and whiting. Of these species, 45.03% of the landed value comes from gill netters and 34.05% of the landed value is from draggers. Pound netters bring in 13.5% of the landed value; handliners bring 5.43%; haul seiners bring 1.78%; trollers bring 0.07%; and less than 0.01% of the total landed value comes from crab pots.

Summer flounder is 40.81% of the total landed value for these species in 1992 and is the most important in terms of landed value in Wanchese. Weakfish is the second most valuable (24.35% of total value) followed by dogfish (14.50%).

1.2. Management Objectives

The objectives of the FMP are:

1. Enhance the probability of successful (i.e., the historical average) recruitment to the fisheries.
2. Promote the growth of the US commercial fishery, including the fishery for export.
3. Provide the greatest degree of freedom and flexibility to all harvesters of these resources consistent with the attainment of the other objectives of this FMP.
4. Provide marine recreational fishing opportunities, recognizing the contribution of recreational fishing to the national economy.
5. Increase understanding of the conditions of the stocks and fisheries.
6. Minimize harvesting conflicts among US commercial, US recreational, and foreign fishermen.

2. METHODOLOGY AND FRAMEWORK FOR ANALYSIS

The basic approach adopted in this RIR is an assessment of management measures from the standpoint of determini the resulting changes in costs and benefits to society. The effects of actions were analyzed by employing quantitative approaches to the extent possible. Otherwise, qualitative analyses were conducted.

3. IMPACTS OF PROPOSED ALTERNATIVES

3.1. Proposed Action

Regulations implementing the Fishery Management Plan for the Atlantic Mackerel, Squid, and Butterfish Fisheries (FMP) prepared by the Council appear at 50 CFR Part 648. These regulations stipulate that the Secretary will publish notice specifying the initial annual amounts of the initial optimum yield (IOY) as well as the amounts for allowable biological catch (ABC) domestic annual harvest (DAH), domestic annual processing (DAP), joint venture processing (JVP), and total allowable levels of foreign fishing (TALFF) for the species managed under the FMP. No reserves are permitted under the FMP for any of these species. Procedures for determining the initial annual amounts are found ir §648.21. The term IOY is used in this fishery to reinforce the fact that the Regional Administrator may alter this specification up to the ABC if economic and social conditions warrant an increase. Therefore, this specification is no different than OY or optimum yield.

3.1.1. Atlantic Mackerel

The 2000 proposed initial specifications for Atlantic mackerel are contained in Table 1 below.

TABLE 1. PROPOSED INITIAL ANNUAL SPECIFICATIONS FOR ATLANTIC MACKEREL FOR THE FISHING YEAR JANUARY 1 THROUGH DECEMBER 31, 1999 (in metric tons (mt))

Max OY	N/A[1]
ABC	347,000
IOY	75,000
DAH	75,000[2]
DAP	50,000
JVP	10,000[3]
TALFF	0

[1] Not applicable; see the FMP.

[2] Contains 15,000 mt projected recreational catch based on the specifications contained in the regulations (50 CFR part 648).

[3] May be increased to 15,000 mt at the discretion of the Regional Administrator.

The specification of IOY for 2000 is 75,000 MT. This level of exploitation will not cause a significant change in the me biomass estimate from its present state.

Although the trend has been declining, the smoothed mean weight of the fish had ranged between 1.723 and 1.881 pounds for the period 1987 to 1990. From 1970 to 1986, the smoothed mean weight ranged between 0.348 and 1.482 These levels of IOY should not cause immediate significant changes in the size of individual fish.

The effects of a continued large stock of Atlantic mackerel on other species of fish are determined primarily through prey- predator relationships (see section 3.3). The diet of Atlantic mackerel is made up primarily of crustaceans and, a lesser extent, other fish. However, several species of fish prey on Atlantic mackerel including commercially importa species such as Atlantic cod, swordfish, and bluefin tuna. Mackerel are also an important item in the diet of endangered and threatened marine mammals.

The specification of ABC and IOY far exceed the recent performance level of the commercial fisheries for Atlantic mackerel. For example, the specification of IOY for 2000 is 75,000 mt, which is about five times the 1996 and 1997 landings and about nine times the annual landings in 1995 and 1994. As a result, the proposed specifications for Atlantic mackerel will have no negative impacts on businesses involved in the commercial harvest, processing or marketing of Atlantic mackerel.

3.1.2. Atlantic Squids and Butterfish

The proposed initial specifications for the 2000 Atlantic squid and butterfish fisheries are contained in Table 2 below.

The proposed IOY specifications for the 2000 squid fisheries are 24,000 MT for *Illex* and 13,000 MT for *Loligo* . Rece

TABLE 2. PROPOSED INITIAL ANNUAL SPECIFICATIONS FOR THE ATLANTIC SQUID AND BUTTERFISH FOR THE FISHING YEAR, JANUARY 1 THROUGH DECEMBER 31, 2000 (in metric tons (mt)).

Specifica-tions	Squid		Butterfish
	Loligo	*Illex*	
Max OY[1]	26,000	24,000	16,000
ABC	13,000	24,000	7,200
IOY	13,000	24,000	5,900
DAH	13,000	24,000	5,900
DAP	13,000	24,000	5,900
JVP	0	0	0
TALFF	0	0	0

[1] Maximum OY as stated in the FMP.

increases in the domestic harvest of these species reflect enhanced economic opportunities emanating from the shortage of supply of *Illex* and *Loligo* in the world market.

The removal of 24,000 MT of *Illex* and 13,000 MT of *Loligo* will have no significant effect on the abundance of these stocks. The Max OY of 24,000 MT for *Illex* is based upon the recommendation of SAW-29. The Max OY of 26,000 MT *Loligo* equals the MSY for the fishery based on the assumption that *Loligo* live only one year from SAW-21 and SAW-29. The proposed 2000 specifications for butterfish will have no effect on the fisheries for this species relative to 1999 specifications because they remain unchanged from those levels. The 2000 specification of 24,000 mt for ABC and I for *Illex* represent an increase from 22,800 mt in 1999. The increase in these specifications in 2000 reflect the finding of SAW-29 which indicated that *Illex* landings of 24,000 mt will have a positive impact on the US fisheries for *Illex* by allowing a slightly higher level of landings while preventing overfishing of the stock. The proposed specifications for *Loligo* will have a short term negative effect on the *Loligo* fisheries since the fisheries have landed in excess of 13,000 mt in recent years. However, SAW-29 concluded that the *Loligo* stock is approaching an overfished condition and tha overfishing is occurring. A reduction in the specifications as proposed will end overfishing and will allow the stock to rebuild to a level at or near that which will support MSY within three years. Thus, the short term reduction in specifications for *Loligo* in 2000 will yield long term benefits to both the stock and the fishery.

3.1.2.1 Other Management Actions: Adjustment of Minimum Mesh Requirement Language for *Loligo*

Amendment 5 to the Atlantic Mackerel, Squid and Butterfish FMP established a minimum mesh requirement of 1 7/8" for owners or operators of vessels possessing *Loligo* squid. Amendment 5 also established restrictions relative to codend mesh as a management measure which could be modified through the annual specification process. For 200 the Council has chosen to modify the mesh requirement for *Loligo* as follows:

“The inside webbing of the codend shall be the same circumference or less than the outside webbing (strenghtener). addition, the inside webbing shall not be more than two feet longer than the outside webbing”. The addition of this language should greatly improve enforcement of the mesh requirements in the *Loligo* fishery.

3.2. Alternatives to the Proposed Action

3.2.1 Alternatives to the Proposed Action for Atlantic mackerel in 2000

3.2.1.1 Maintain the 1999 quota specifications for Atlantic mackerel in 2000

The first Alternative action considered by the Council was to maintain the 1999 specifications for Atlantic mackerel fo 2000. The 1999 specifications included the specification of ABC at 382,000. The 1999 specification of ABC at 382,0C mt would not be valid for 2000 since overfishing definition adopted in Amendment 8 resulting in a lower specification ABC. The 1999 specifications included ABC specified as the yield associated with fishing mortality rate of $F_{0.1}$. Overfishing in Amendment 8 is defined to occur when the catch associated with a threshold fishing mortality rate of F_{msy} is exceeded. When SSB is greater than 890,000 mt, the overfishing limit is F_{MSY} (F=0.45), and the target F is the tenth bootstrap percentile of F_{MSY} (F=0.25). To avoid low levels of recruitment, the threshold F decreases linearly from 0.45 at 890,000 mt SSB to zero at 225,000 mt SSB (1/4 B_{MSY}), and the target F decreases linearly from 0.25 at 890,000 mt SSB to zero at 450,000 mt SSB (½ B_{MSY}). Annual quotas are be specified which correspond to a target fishing mortality rate according to this control law. The yield associated with the target fishing mortality rate of F=0.25 adopted in Amendment 8 is 369,000 mt. Therefore, the ABC recommendation consistent with Amendment 8 is 347,000 mt (F=0.25 yield estimate of 369,000 mt - the estimated Canadian catch of 22,000 mt).

3.2.1.2 Specify ABC for Atlantic mackerel at long term potential catch

The Council had proposed in Amendment 5 that the ABC specification be capped at long term potential catch (LTPC) The most recent estimate of LTPC was 150,000 mt. The use of LTPC as an upper bound on ABC was found to be inappropriate because it would not allow for variations and contingencies in the status of the stock. For example, the current adult stock was recently estimated to exceed 2.1 million mt. The specification of ABC at LTPC would effectiv result in an exploitation rate of only about 6%, well below the optimal level of exploitation. The level of foregone yielc under this alternative was considered unacceptable.

3.2.1.3 Specify JVP at 0 mt for Atlantic mackerel

Another alternative the Council considered was the elimination of JVP for 2000. The Council rejected this option because they recognized the need for JV's in 2000 to allow US harvesters to take mackerel at levels in excess of curr US processing capacity. However, in the future the Council intends to eliminate JV's as US processing and export capacity increases.

3.2.2 Alternatives to the Proposed Action for *Loligo* in 2000

3.2.2.1 For *Loligo* specify Max OY at 26,000 mt and ABC, IOY, DAH and DAP at 11,700 mt

The specifications of 26,000 mt for Max OY and ABC, and IOY, DAH and DAP at 11,700 for the *Loligo* fishery would r cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for *Loligo* using recently developed information on the age and growth of *Loligo* using daily statolith growtl increments. These findings indicate that *Loligo* is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three years. As a result, real-time assessment/management system will be needed to attain f exploitation of the stocks while, at the same time, ensuring that adequate levels of spawning stock are maintained. Amendment 6 to the FMP established a new definition of overfishing for *Loligo* (F_{max}) and also recommended that annual quotas be specified at a target fishing mortality rate of F_{50}.

3.2.3 Alternatives to the Proposed Action for *Illex* in 2000

3.2.3.1 For *Illex* specify Max OY, ABC, IOY, DAH, DAP at 30,000 mt

The specifications of 30,000 mt for Max OY, ABC, IOY, DAH and DAP for the *Illex* fishery may cause a significant change in the abundance of the resource or the all size index. A yield per recruit analysis was performed for *Illex* usin recently developed information on the age and growth of *Illex* using daily statolith growth increments. These findings indicate that Illex is an annual species that grows rapidly and is not as long-lived as previously thought, i.e. three year As a result the biological reference points for *Illex* were re-estimated in SAW-21. The Council recently developed Amendments 6 and 8 to the FMP which incorporated the recommendations of SAW- 21 in the development of a new definition of overfishing for Illex and also recommended that overfishing be defined to occur when fishing mortality exceeds F_{msy}. The current estimate of yield at F_{msy} equals 24,000 mt. If ABC, IOY, DAH and DAP were all specified a level above that associated with the overfishing threshold (F_{msy}), then the Council would not be implementing the FMF according to the most recent Amendment . In addition, SAW-21 advised that catches in excess of 24,000 mt may onl be attainable in years of high abundance.

3.2.4 Alternatives to the Proposed Action for butterfish in 2000

3.2.4.1 Specify DAH and OY at MAX OY (16,000 mt)

The most recent stock assessment advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish higher than these levels wou be deleterious to the stock and the fishery.

3.2.4.2 Specify DAH and OY at 10,000 mt (1995 specification)

As noted above, the most recent stock assessment for butterfish advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain lev in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish as hig as 10,000 mt would be deleterious to the stock and the fishery.

4. DETERMINATIONS OF A SIGNIFICANT REGULATORY ACTION

The proposed action does not constitute a significant regulatory action under Executive Order 12866 for the following reasons. (1) It will not have an annual effect on the economy of more than $100 million. Based on unpublished NMFS preliminary data (Maine-North Carolina) the total commercial value for the Atlantic mackerel, squid and butterfish fisheries was estimated at $48.7 million in 1998. The measures considered in this regulatory action will not affect tota revenues generated by the commercial industry to the extent that a $100 million annual economic impact will occur. The proposed actions are necessary to maintain the harvest of squid and butterfish at sustainable levels. The propos action benefits in a material way the economy, productivity, competition and jobs. The proposed action will not adversely affect, in the long-term, competition, jobs, the environment, public health or safety, or state, local, or tribal government communities. (2) The proposed actions will not create a serious inconsistency or otherwise interfere with action taken or planned by another agency. No other agency has indicated that it plans an action that will affect the Atlantic mackerel, squid and butterfish fisheries in the EEZ. (3) The proposed actions will not materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of their participants. (4) The proposed actions do not raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in this Executive Order.

5. REVIEW OF IMPACTS RELATIVE TO THE REGULATORY FLEXIBILITY ACT

5.1. Introduction

The purpose of the Regulatory Flexibility Act (RFA) is to minimize the adverse impacts from burdensome regulations and record keeping requirements on small businesses, small organizations, and small government entities. The category of small entities likely to be affected by the proposed plan is that of commercial Atlantic mackerel, squid and butterfish fishermen. The impacts of the proposed action on the fishing industry and the economy as a whole were discussed above. The following discussion of impacts centers specifically on the effects of the proposed actions on th mentioned small businesses entities.

5.2. Determination of Significant Economic Impact on a Substantial Number of Small Entities

The Small Business Administration (SBA) defines a small business in the commercial fishing and recreational fishing activity, as a firm with receipts (gross revenues) of up to $2.0 and $3.0 million, respectively. According to NMFS perr file data (8 September 1999) 1980 commercial vessels were holding Atlantic mackerel permits, 425 vessels were holding *Loligo*/butterfish moratorium permits, 77 vessels possessed *Illex* permits, 1527 vessels held incidental catch permits and 604 vessels held party/charter permits. There was a total of 2737 distinct vessels holding one or more of the permits described above. All of these vessels readily fall within the definition of small business.

According to guidelines on regulatory analysis of fishery management actions, a "substantial number" of small entities more than 20 percent of those small entities engaged in the fishery (NMFS 1994). Since the proposed action will directly and indirectly affect most of these vessels, the "substantial number" criterion will be met.

Economic impacts on small business entities are considered to be "significant" if the proposed action would result in a of the following: a) a reduction in annual gross revenues by more than 5 percent; b) an increase in total costs of production by more than 5 percent as a result of an increase in compliance costs; c) an increase in compliance costs a percent of sales for small entities at least 10 percent higher than compliance costs as a percent of sales for large entities; d) capital costs of compliance represent a significant portion of capital available to small entities, considering internal cash flow and external financing capabilities; or, e) as a "rule of thumb," 2 percent of small businesses entities being forced to cease business operations (NMFS 1994).

5.3. Analysis of Economic Impacts

5.3.1 Proposed Management Measures

The analyses under economic impacts for each of the proposed management measures analyzed in this section do n show that any business will be forced to cease operations. The implementation of the quota specifications will allow t squid, mackerel, and butterfish fisheries to operate at sustainable levels, thereby increasing revenues and profits to th industry in the long term relative to an unregulated fishery. In the case of the Atlantic mackerel fisheries, the 2000 specifications should allow for the orderly development of this underutilized species in a controlled manned. For Atla mackerel, *Illex* squid, and butterfish, gross revenues are not expected to change as a consequence of the proposed actions. In the case of butterfish and Atlantic mackerel, the specifications for IOY remain unchanged relative to the 1999 specifications. In the case of *Illex*, the 2000 specifications represent an increase in the specification of ABC relative to 1999. For Atlantic mackerel, *Illex,* and butterfish there exists a surplus between the 2000 ABC specificatio and what has been landed in recent years. Therefore it is correct to assume that the ABC specifications will represen no constraint on vessels in these fisheries in aggregate or individually. In the absence of such constraints, there is n impact on revenues under the Regulatory Flexibility Act.

In the case of *Loligo*, because the species has been designated as overfished, the Council is required under the Sustainable Fisheries Act to implement a stock rebuilding strategy which will allow the *Loligo* stock to rebuild to levels which will support MSY in ten years or less. Stock projections from SAW-29 indicated that the stock would rebuild relatively quickly to the B_{msy} level in three to five years if fishing mortality is reduced below F_{msy}. As a result, the Cour chose to specify ABC for 2000 at 90% of F_{msy} or 13,000 mt. This specification represents a reduction from the 21,000 ABC specified in 1999. However, the specification represents only an 18% reduction in landings relative to the avera landings for the past three years (1996-1998). The ABC specification for Loligo, therefore, will likely result in a reduct in revenue greater than 5% for vessels engaged in the directed fishery for *Loligo* relative to landings in recent years.

The potential changes in revenues for the 2000 Loligo ABC specification were evaluated in this analysis relative to ba year of 1997. This year was chosen since it approximates the average of landings for the period 1996-1998. As notec earlier, gross revenues are expected to decrease as a consequence of the proposed actions since the 2000 ABC specifications are less than what has been landed in recent years. During the period 1996-1998, *Loligo* landings averaged 15,900 mt valued (on average) at $25.8 million. The proposed ABC specification for *Loligo* in 1999 is 13,0 mt or a reduction of 2858 mt relative to the 1996-1998 landings. Reductions in gross revenues to vessels is expected be about $4.65 million, assuming no increase in the price of *Loligo* in 2000. In 1997, a total of 443 vessels landed 16,300 mt of *Loligo* based on unpublished NMFS Dealer Reports. Based on this year, gross revenues for vessels engaged in the directed *Loligo* fishery are expected to lose, on average, about $12,000 per vessel in 2000 or about 18 of their revenue derived from *Loligo* fishing. Revenue losses would be less if the price of *Loligo* were to increase as a result of decreased supply of the product on world markets.

Of the 443 vessels which reported landing *Loligo* in 1997, 121 vessels would be expected to experience a reduction i total gross revenues (all species combined) between 5 and 10% as a result of the 18% reduction in the *Loligo* quota ir 2000. This represents 27.3% of the vessels which landed *Loligo* in 1997. The remaining vessels (322 or 72.7%) are expected to experience a reduction in total gross revenues (all species combined) of less than 5% as a result of the 1 reduction in the *Loligo* quota in 2000. It can be concluded that the proposed reduction in the *Loligo* quota in 2000 represents a significant economic impact on small entities under the Regulatory Flexibility Act.

As noted above, 121 vessels are expected to experience a reduction of total gross revenues of greater than 5% due t the proposed 13,000 mt *Loligo* quota in 2000. The size distribution of all vessels (in terms of length and gross registered tonnage) which landed *Loligo* in 1997 is presented in Table 4. Of the 443 vessels that reported landing *Loligo* in 1997, vessel attributes for vessel length and gross registered tonnage are available for 392 vessels from unpublished NMFS permit file data. In terms of length, about 70% of those vessels were less than 75 ft in length, whi the remaining vessels (30%) were greater than 75 ft. A comparison of the length distribution of vessels affected by th proposed quota of 13,000 mt (i.e., those vessels expected to experience a reduction in total gross revenues (all speci combined) of greater than 5 %) indicates that the impact of the proposed quota reduction appears to be equal across length and tonnage classes. That is, a comparison of the frequency distributions of length and ton class for the total pool of vessels which landed Loligo in 1997 and those affected indicates that there are no disproportionate effects by vessel size class. For example, 19.4% of all vessels which landed *Loligo* in 1997 were 25-49 ft in length while 18.9% the affected vessels were in this length class. This comparison yields similar conclusions across all length and ton classes of vessels in the fishery.

Therefore, it is concluded that overall, there are not expected to be any differential effects by size class of vessel due the 13,000 mt quota proposed for *Loligo* in 2000. However, management advice from SAW 29 made special note of the fact that yield from this fishery should be distributed throughout the fishing year. Given that the current permitted fleet historically has demonstrated the ability to land *Loligo* in excess of the 13,000 quota proposed for 2000, the Council recommends that the annual quota be sub-divided into three quota period or trimesters. The quota will be allocated to each period based on the proportion of landings occurring in each trimester from 1994-1998. Based on t seasonal distribution of landings during this time period, the quota for January-April is 5,460 mt (42% of the total), the quota for May-August is 2,340 mt (18% of the total), and the quota for September-December is 5200 mt (40% of the total). The directed fishery during the first two trimester periods would be closed when 90% of the amount allocated t the period was landed and then a trip limit of 2,500 pounds will remain in effect until the quota period ends. Any underages from trimesters one and two will be applied to the next trimester and overages will be deducted from trimester three. The directed fishery will be closed in the third trimester when 95% of the annual quota has been take It is expected that the trip limits are more likely to affect larger vessels which operate offshore to a greater degree tha small inshore vessels. The trip limit trigger is necessary, however, to ensure that the quota allocation for a given trimester period is not exceeded, as well as the overall annual quota.

Descriptive data for vessels which landed *Loligo* in 1997 relative to home port state, principal port of landing state anc vessel owner's state of residence are given in Tables 6-8. In addition, Tables 6-8 provide a relative comparison of the same data for vessels expected to be affected by the proposed 13,000 mt quota for *Loligo* in 2000. Overall, New Yor appears to be the most heavily impacted state. For example, in terms of principal port of landing, vessels landing in New York ports accounted for 21.5% of all vessels landing *Loligo* in 1997. However, vessels landing in New York por are expected to account for 37.8% of vessels affected by the proposed 13,000 mt quota for *Loligo* in 2000. The distribution of vessels expected to be impacted by the proposed quota of 13,000 mt by state, county and home port is given in Table 9.

From 1996-1998, *Illex* landings averaged 17,769 mt valued (on average) at $8.3 million. The proposed ABC specification for *Illex* in 2000 is 24,000 mt. Hence, there exists a surplus between the 2000 ABC specification and wh has been landed in recent years. Therefore, it is correct to assume for the 2000 *Illex* fishery that the ABC specificatio will represent no constraint on vessels in the *Illex* fishery in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act.

From 1996-1998, butterfish landings averaged 2,747 mt valued (on average) at $4.1 million. The proposed ABC specification for butterfish in 2000 is 7,200 mt. Hence, there exists a surplus between the 2000 ABC specification anc what has been landed in recent years. Therefore, it is correct to assume for the 2000 butterfish fishery that the ABC specification will represent no constraint on vessels in the butterfish fishery in aggregate or individually. In the absen of such constraints, there is no impact on revenues under the Regulatory Flexibility Act.

In the case of the Atlantic mackerel specifications the 2000 specification of IOY (75,000 mt) far exceeds landings of th species for the period 1996-1998 (average=15,452 mt). The IOY specification far exceeds recent harvest in the fishe and the specification of ABC is an order of magnitude greater than recent landings. Therefore, the proposed 2000 quota specifications for the Atlantic mackerel fishery represent no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there is no impact on revenues under the Regulatory Flexibility Act.

In addition to the quota specifications summarized above, the Council also recommends additional language be adde to the regulations pertaining to gear requirements in the *Loligo* fishery. Industry members testified that some fisherme may be rigging the inner portion of the codends used in the *Loligo* fishery in such a manner that alters the intended selective properties of the regulated mesh size by using an inner codend of substantially greater circumference than t outer portion of the codend (i.e., the strenghtener). The Council proposes to remedy this situation by adding the following language to the *Loligo* mesh restriction section of the regulations governing the *Loligo* fishery: "The inside webbing of the codend shall be the same circumference or less than the outside webbing (strenghtener). In addition, the inside webbing shall not be more than two feet longer than the outside webbing". The addition of this language should greatly improve enforcement of the mesh requirements in the *Loligo* fishery and should not affect costs associated with rigging codends for use in this fishery.

5.3.2 Alternative Management Measures

5.3.2.1 Atlantic mackerel

The first alternative action for Atlantic mackerel considered by the Council was to maintain the 1999 specifications for Atlantic mackerel for 2000. The 1999 specifications included the specification of ABC at 382,000. The 1999 specification of ABC at 382,000 mt would not be valid for 2000 since the overfishing definition adopted in Amendmen resulting in a lower specification of ABC. Therefore, this alternative was rejected. This option would not have change the specification of IOY, however. The 2000 specification of IOY (75,000 mt) far exceeds landings of the species for period 1996-1998 (average=15,452 mt). This IOY specification far exceeds recent harvest in the fishery and the specification of ABC at 382,000 mt is an order of magnitude greater than recent landings. Therefore, this alternative the proposed 2000 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

The second alternative action for Atlantic mackerel considered by the Council was to specify ABC at long term potent catch (LTPC). The most recent estimate of LTPC was 150,000 mt. The use of LTPC as an upper bound on ABC was found to be inappropriate because it would not allow for variations and contingencies in the status of the stock. This option would not have changed the specification of IOY, however. The 2000 specification of IOY (75,000 mt) far exceeds landings of the species for the period 1996-1998 (average=15,452 mt). This IOY specification far exceeds recent harvest in the fishery and the specification of ABC at 150,000 mt is an order of magnitude greater than recent landings. Therefore, this alternative to the proposed 2000 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

The third alternative the Council considered for Atlantic mackerel was the elimination of JVP for 2000. The Council rejected this option because they recognized the need for JV's in 2000 to allow US harvesters to take mackerel at leve in excess of current US processing capacity. This option would have changed the specification of IOY to 65,000 mt. However, the specification of IOY at 65,000 mt far exceeds landings of the species for the period 1996-1998 (average=15,452 mt). This IOY specification far exceeds recent harvest in the fishery and the specification of ABC a 347,000 mt is an order of magnitude greater than recent landings. Therefore, this alternative to the proposed 2000 quota specifications for the Atlantic mackerel fishery would have represented no constraint on vessels in the fishery i aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

5.3.2.1 *Loligo* and *Illex* squid

5.3.2.2 Alternatives to the Proposed Action for *Loligo* in 2000

The alternative considered for *Loligo* in 2000 was to specify Max OY at 26,000 mt and ABC, and IOY, DAH and DAP 11,700. At this level, the Council would be specifying ABC for 2000 at 75% of F_{msy} or 11,700 mt. This specification represents a reduction from the 21,000 mt ABC specified in 1999. However, the specification represents only an 26% reduction in landings relative to the average landings for the past three years (1996-1998). The ABC specification for *Loligo* under this alternative, therefore, will likely result in a reduction in revenue greater than 5% for vessels engaged the directed fishery for *Loligo* relative to landings in recent years.

The potential changes in revenues for the 2000 *Loligo* ABC specification were evaluated in this analysis relative to ba year of 1997. This year was chosen since it approximates the average of landings for the period 1996-1998. As notec earlier, gross revenues are expected to decrease as a consequence of this alternative since this ABC specification is less than what has been landed in recent years. During the period 1996-1998, *Loligo* landings averaged 15,900 mt valued (on average) at $25.8 million. The proposed ABC specification for *Loligo* under this alternative would be 11,7 mt or a reduction of 4154 mt relative to the 1996-1998 landings. Reductions in gross revenues to vessels is expected be about $6.74 million, assuming no increase in the price of *Loligo* in 2000. In 1997, a total of 443 vessels landed 16,300 mt of *Loligo* based on unpublished NMFS Dealer Reports. Based on this year, gross revenues for vessels engaged in the directed *Loligo* fishery are expected to lose, on average, about $15,214 per vessel in 2000 or about 26 of their revenue derived from *Loligo* fishing. Revenue losses would be less if the price of *Loligo* were to increase as a result of decreased supply of the product on world markets. Of the 443 vessels which reported landing *Loligo* in 1997 161 vessels would be expected to experience a reduction in total gross revenues (all species combined) greater than % as a result of the 26% reduction in the *Loligo* quota in 2000 under this alternative. This represents 36% of the vessels which landed *Loligo* in 1997. The remaining vessels (282 or 64%) would experience a reduction in total gross revenues (all species combined) of less than 5% as a result of a 26% reduction in the *Loligo* quota in 2000. It can be concluded that the proposed reduction in the Loligo quota in 2000 under this alternative represents a significant economic impact on small entities under the Regulatory Flexibility Act.

As noted above, 161 vessels are expected to experience a reduction of total gross revenues of greater than 5% due t the alternative quota of 11,700 mt for *Loligo* in 2000. The size distribution of all vessels (in terms of length and gross registered tonnage) which landed *Loligo* in 1997 is presented in Table 5. Of the 443 vessels that reported landing *Loligo* in 1997, vessel attributes for vessel length and gross registered tonnage are available for 392 vessels from unpublished NMFS permit file data. In terms of length, about 70% of those vessels were less than 75 ft in length, whi the remaining vessels (30%) were greater than 75 ft. A comparison of the length distribution of vessels affected by th proposed quota of 11,700 mt (i.e., those vessels expected to experience a reduction in total gross revenues (all speci combined) of greater than 5 %) indicates that the impact of the proposed quota reduction appears to be equal across length and tonnage classes. That is, a comparison of the frequency distributions of length and ton class for the total pool of vessels which landed *Loligo* in 1997 and those affected indicates that there are no disproportionate effects by vessel size class. For example, 19.4% of all vessels which landed *Loligo* in 1997 were 25-49 ft in length while 17.5% the affected vessels were in this length class. This comparison yields similar conclusions across all length and ton classes of vessels in the fishery.

Descriptive data for vessels which landed *Loligo* in 1997 relative to home port state, principal port of landing state anc vessel owner's state of residence are given in Tables 6-8. In addition, Tables 6-8 provide a relative comparison of the same data for vessels expected to be affected by the alternative quota of 11,700 mt for *Loligo* in 2000. Overall, New York appears to be the most heavily impacted state. For example, in terms of principal port of landing, vessels landir in New York ports accounted for 21.5% of all vessels landing *Loligo* in 1997. However, vessels landing in New York ports are expected to account for 32.9% of vessels affected by the proposed 11,700 mt quota for *Loligo* in 2000. The distribution of vessels expected to be impacted by the alternative quota of 11,700 mt by state, county and home port i given in Table 10.

5.3.2.3 Alternatives to the Proposed Action for *Illex* in 2000

5.3.2.3.1 For *Illex* specify Max OY, ABC, IOY, DAH, DAP at 30,000 mt

The alternative specifications considered for *Illex* for 2000 were 30,000 mt for Max OY, ABC, IOY, DAH and DAP. These specifications far exceed recent harvest in the fishery. Therefore, this alternative to the proposed 2000 quota specifications for the *Illex* fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibil Act under this alternative.

5.3.2.4 Alternatives to the Proposed Action for butterfish in 2000

5.3.2.4.1. Specify DAH and OY at MAX OY (16,000 mt)

The most recent stock assessment advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain levels in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish higher than these levels wou be deleterious to the stock and the fishery. These specifications far exceed recent harvest in the fishery. Therefore, this alternative to the proposed 2000 quota specifications for the butterfish fishery would have represented no constra on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact c revenues under the Regulatory Flexibility Act under this alternative.

5.3.2.4.2 Specify DAH and OY at 10,000 mt (1995 specification)

As noted above, the most recent stock assessment for butterfish advised that even though MSY was estimated to be 16,000 mt, short term yields should not exceed 7,200 mt. The current abundance level probably could not sustain lev in excess of 5,900 mt assuming an appropriate estimate of discarding is 1,300 mt. Specifications for butterfish as hig as 10,000 mt would be deleterious to the stock and the fishery. These specifications far exceed recent harvest in the fishery. Therefore, this alternative to the proposed 2000 quota specifications for the butterfish fishery would have represented no constraint on vessels in the fishery in aggregate or individually. In the absence of such constraints, there would be no impact on revenues under the Regulatory Flexibility Act under this alternative.

5.4. Explanation of Why The Action is Being Considered

Regulations implementing the Fishery Management Plan for the Atlantic Mackerel, Squid, and Butterfish Fisheries (FMP) prepared by the Council appear at 50 CFR Part 648. These regulations stipulate that the Secretary will publish notice specifying the initial annual amounts of the initial optimum yield (IOY) as well as the amounts for allowable biological catch (ABC) domestic annual harvest (DAH), domestic annual processing (DAP), joint venture processing (JVP), and total allowable levels of foreign fishing (TALFF) for the species managed under the FMP.

5.5. Objectives and Legal Basis for the Rule

Refer to the section on Management Objectives of the Amendment document (section 4.3). The Magnuson-Stevens Fishery Conservation and Management Act (Public Law 94-265) as amended through October 11, 1996 provides the legal basis for the rule.

5.6. Demographic Analysis

Refer to the sections on description of fishing activities (section 7), economic characteristics of the fishery (section 8), and the fishery impact statement (section 9.2.6) of Amendment 5 to the Atlantic mackerel squid and butterfish FMP.

5.7. Cost Analysis

Refer to the section on Regulatory Impact Analysis.

5.8. Competitive Effects Analysis

There are no large businesses involved in the industry, therefore, there are no disproportional small versus large business effects. There are no disproportional costs of compliance among the affected small entities.

5.9. Identification of Overlapping Regulations

The proposed action does not create regulations that conflict with any state regulations or other federal laws.

5.10. Conclusions

The preceding analysis of impacts relative to the Regulatory Flexibility Act indicates that the proposed regulatory actic do not result in significant economic impacts on small entities.

6. PAPER WORK REDUCTION ACT OF 1995

The Paperwork Reduction Act concerns the collection of information. The intent of the Act is to minimize the Federal paperwork burden for individuals, small business, state and local governments, and other persons as well as to maximize the usefulness of information collected by the Federal government.

The Council is not proposing measures under this regulatory action that will involve increased paper work and consideration under this Act.

7. IMPACTS OF THE PLAN RELATIVE TO FEDERALISM

The 2000 specifications do not contain policies with federalism implications sufficient to warrant preparation of a federalism assessment under Executive Order 12612.

Table 3 . Summary of impacts of proposed and alternative specifications for 2000 for Atlantic mackerel, *Loligo* and *Illex* squid and butterfish.

Species	Option	Total No. Vessels	Total Revenue Reduction ($ millions)	Revenue Reduction/ vessel ($)	No. vessels w/revenue reduced by > 5%	No. vessels w/re-venue reduced by < 5%
Loligo	Proposed	443	4.65	12,000	121	322
Loligo	Alt. 1	443	6.74	15,214	161	282
Illex	Proposed	77	0	0	0	77
Illex	Alt. 1	77	0	0	0	77
butterfish	Proposed	443	0	0	0	443
butterfish	Alt. 1	443	0	0	0	443
butterfish	Alt. 2	443	0	0	0	443
A. mackerel	Proposed	1980	0	0	0	1980
A. mackerel	Alt. 1	1980	0	0	0	1980
A. mackerel	Alt. 2	1980	0	0	0	1980
A. mackerel	Alt. 3	1980	0	0	0	1980

Table 4. Comparison of the size distribution of all vessels which landed *Loligo* in 1997 and those expected to have total gross revenues reduced by >5% as a result of the preferred alternative quota (13,000 mt) for *Loligo* in 2000.

	Vessels that landed *Loligo* in 1997		Affected Vessels[1]	
length (ft)	# vessels	% vessels	# vessels	% vessels
25 - 49	76	19.4	21	18.9
50 - 74	197	50.3	53	47.7
75 - 99	111	28.3	35	31.5
100 - 124	8	2.0	2	1.8
total	392	100	111	100

ton class	# vessels	% vessels	# vessels	% vessels
1	3	0.8	1	0.9
2	118	30.1	34	29.7
3	203	51.8	64	57.4
4	68	17.3	12	10.8
total	392	100	111	100

[1] Vessels with revenues reduced by >5%
[2] TC 1= <5 GRT; TC 2= 5 - 50 GRT; TC 3= 51 - 150- GRT; TC 4= >150 GRT
Source: unpublished NMFS permit file data.

Table 5. Comparisons of the size distribution of all vessels which landed *Loligo* in 1997 and those expected to have total gross revenues reduced by >5% as a result of the non-preferred alternative quota (11,700 mt) for *Loligo* in 2000.

	Vessels that landed *Loligo* in 1997		Affected Vessels[1]	
length (ft)	# vessels	% vessels	# vessels	% vessels
25 - 49	76	19.4	26	17.5
50 - 74	197	50.3	74	49.7
75 - 99	111	28.3	46	30.9
100 - 124	8	2.0	3	2.0
total	392	100	149	100.00

ton class	# vessels	% vessels	# vessels	% vessels
1	3	0.8	1	0.7
2	118	30.1	41	27.5
3	203	51.8	81	54.4
4	68	17.3	26	17.5
total	392	100	149	100.00

[1] Vessels with revenues reduced by >5%
[2] TC 1= <5GRT; TC 2= 5 - 50 GRT; TC 3= 51 - 150 GRT; TC 4= >150 GRT
Source: unpublished NMFS permit file data.

Table 6. Distribution of vessels by home port state which landed *Loligo* in 1997 v. those affected by the proposed quota of 13,000 mt and alternative quota of 11,000 mt for *Loligo* in 2000.

	All vessels landing *Loligo in 1997*		Preferred Quota (13,000 mt)		Alternative Quota (11,700 mt)	
Home Port State	# vessels	% vessels	# vessels	% vessels	# vessels	% vessels
MA	100	25.6	23	20.7	31	20.8
MD	4	1.0	0	0.0	0	0.0
NC	32	8.2	0	0.0	0	0.0
NJ	45	11.5	14	12.6	21	14.1
NY	99	25.3	46	41.4	57	38.2
PA	16	4.1	8	7.2	10	6.7
RI	55	14.1	16	14.4	25	16.8
VA	28	7.2	0	0.0	0	0.0
other	12	3.0	4	3.6	5	3.4
Total	391	100.0	111	100.0	149	100.0

Source: unpublished NMFS permit file data.

Table 7. Distribution of vessels by principal port landing state which landed *Loligo* in 1997 v. those vessels affected by the proposed quota of 13,000 mt and alternative quota of 11,700 mt for *Loligo* in 2000.

	All vessels landing *Loligo* in 1997		Preferred Quota (13,000 mt)		Alternative Quota (11,700 mt)	
Principal Port State	# vessels	% vessels	# vessels	% vessels	# vessels	% vessels
CT	7	1.8	3	2.7	4	2.7
MA	76	19.4	16	14.4	23	15.4
MD	6	1.5	0	0.0	0	0.0
ME	3	0.8	0	0.0	0	0.0
NC	41	10.5	0	0.0	0	0.0
NJ	67	17.1	25	22.5	36	24.2
NY	84	21.5	42	37.8	49	32.9
RI	88	22.5	25	22.5	37	24.8
VA	19	4.9	0	0.0	0	0.0
Total	391	100	111	100.0	149	100.0

Source: unpublished NMFS permit file data.

Table 8. Distribution of vessels by vessel owner's state which landed *Loligo* in 1997 v. those vessels affected by the proposed quota of 13,000 mt and the alternative quota of 11,700 mt for *Loligo* in 2000.

	All vessels landing *Loligo* in 1997		Preferred Quota (13,000 mt)		Alternative Quota (11,700 mt)	
Owner's State	# vessels	% vessels	# vessels	%vessels	# vessels	% vessels
CT	5	1.3	0	0.0	3	2.0
DE	3	0.8	0	0.0	0	0.0
MA	71	18.2	15	13.5	21	14.1
MD	5	1.3	0	0.0	0	0.0
ME	4	1.0	0	0.0	0	0.0
NC	43	11.0	0	0.0	0	0.0
NJ	71	18.2	25	22.5	37	24.8
NY	85	21.7	43	38.7	49	32.9
RI	84	21.5	25	22.5	37	24.8
VA	19	4.9	0	0.0	0	0.0
Other	1	0.2	3	2.7	2	1.3
Total	391	100	111	100.0	149	100.0

Source: unpublished NMFS permit file data.

Table 9. Distribution of affected vessels by state, county and home port from 1997 NMFS permit file data for 13,000 mt *Loligo* quota in 2000.

State	County	Home port	Number of Vessels
Massachusetts	Barnstable	Chatham	4
		Harwichport	3
		Other	2
	Bristol	New Bedford	3
	Suffolk	Boston	11
New Jersey	Cape May	Cape May	10
	Ocean	Point Pleasant	3
New York	New York	New York	34
	Suffolk	Montauk	3
		Shinnecock	3
		Other	2
Pennsylvania	Philadelphia	Philadelphia	8
Rhode Island	Washington	Point Judith	11
	Providence	Other	2

Table 10. Distribution of affected vessels by state, county and home port from 1997 NMFS permit file data for 11,700 mt *Loligo* quota in 2000.

State	County	Home port	Number of Vessels
Massachusetts	Barnstable	Chatham	4
		Harwichport	3
		Other	2
	Bristol	New Bedford	16
	Suffolk	Boston	12
New Jersey	Cape May	Cape May	12
	Ocean	Point Pleasant	5
New York	New York	New York	44
	Suffolk	Montauk	3
		Shinnecock	3
		Other	3
		Greenport	3
Pennsylvania	Philadelphia	Philadelphia	10
Rhode Island	Washington	Point Judith	15
		Wakefield	3
		Other	5

1996 ECONOMIC ANALYSES FOR ATLANTIC MACKEREL SPECIFICATIONS

These analyses were prepared for the environmental analysis of the 1993 and 1994 Atlantic mackerel fishery. Since they are long-term and consider a thirty-year time horizon, they remain valid for the 1996 specifications.

Council Benefit-Cost Analysis for Zero TALFF

The Council's preference for a zero TALFF is based on the argument that the developing, infant US industry needs some level of protection to reach a scale of operations at which it would be competitive with its European counterparts. If infant industry protection is to make sense from a national economic perspective, the cost of protecting the infant until it grows up must be less than the benefits the adult industry will produce. From a strictly economic efficiency point of view, the cost of a zero TALFF program is the foregone fishing fees that could have been earned. The benefits are the net value produced by the industry from increases in production attributable to the zero TALFF policy.

To do a formal benefit-cost analyses, it would first be necessary to know how much TALFF foreigners would actually purchase over a given time span and how much they would be willing to pay for the privilege. Even if there is a high ABC, foreigners will not necessarily want to buy large amounts of TALFF. The maximum they would be willing to purchase is the difference between what they can sell and what they can produce in other parts of the world. Obviously, the price at which TALFF is sold will influence how much will be sold.

It would also be necessary to know how much extra mackerel the domestic industry can sell as a result of the protection, and what value this extra output would provide.

European stocks in the Northeast Atlantic are fished intensively, however, an annual quota usually restricts the large European fleets from capturing an amount large enough to supply the world market. Figure 1

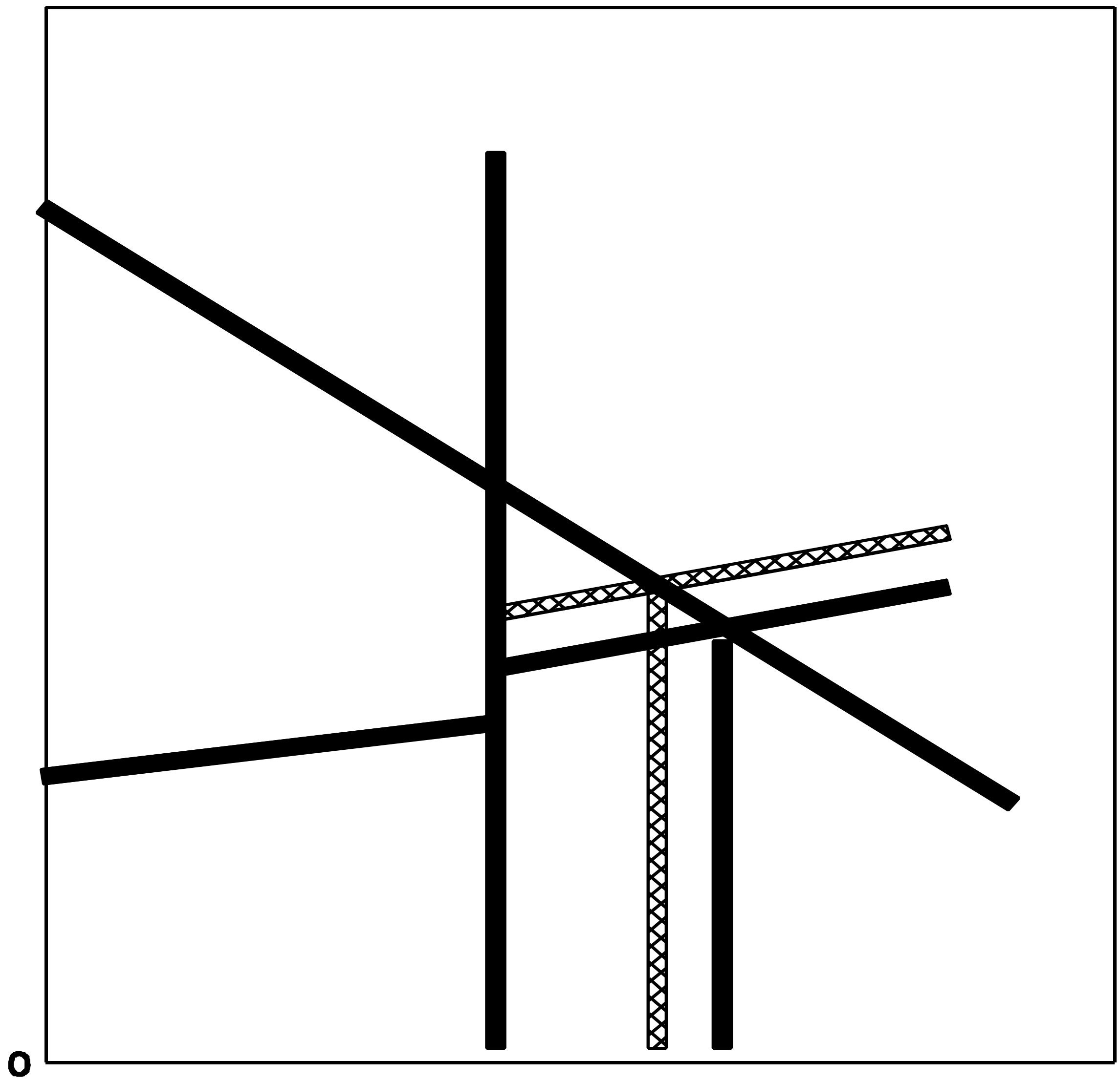

Figure 1. Single market supplied from two stocks (E and W) with quota constraint effective at QE, and stock-specific cost functions for European and US producers as SE(EU), SW(EU) and SW(US).

graphically displays the world market situation in a given year for Atlantic mackerel. The line designated D represents demand for Atlantic mackerel. The line QE (corresponding to quantity QE(EU)) represents the quota-constrained supply from Eastern Atlantic stocks plus cold storage holdings. The line SE(EU) represents the supply schedule for Europeans fishing on the Eastern Atlantic stock up to the quota constraint. The line SW(EU) represents the supply schedule for Europeans fishing on the Western Atlantic stock. The line SW(US) represents the supply schedule for US producers fishing on the Western Atlantic stock. The difference between the quota constraint QE(EU)and the potential equilibrium supply QW(EU) (given European access to Western Atlantic stocks) is an economic shortage, that can also be considered a residual demand for Western Atlantic product. Given the relationships in Figure 1, European producers would desire access to an amount of Western Atlantic mackerel represented by QW(EU)-QE(EU). Less efficient US producers, however, would only supply QW(US)-QE(EU), and could be undersold by European producers for any of this amount that Europeans were able to produce from Western Atlantic stocks.

It is instructive to consider the implications of shifts among the relationships in Figure 1. If the Eastern Atlantic quota increases, or carryover inventories are high, QE would shift to the right, and the residual demand for Western Atlantic mackerel would decline or even disappear. As demand decreases, as in the case of Eastern European countries withdrawing from the market due to lack of hard currency, the residual demand for Western Atlantic mackerel decreases. Quota or demand shifts in the opposite directions would produce correspondingly opposite effects. As the European supply costs from Western Atlantic stocks increase, or US costs decrease, US producers become more competitive in supplying the residual demand. As US production costs from Western Atlantic stocks approach European costs from Eastern Atlantic stocks, then the possibility arises of US production from Western Atlantic stocks supplanting European production from Eastern Atlantic stocks. The crux of the "infant industry" argument is that US producers must reach a certain scale of operation before their costs begin to decline and approach those of their European competitors. Thus, it is said to be necessary to "protect" at least the residual market for Western Atlantic fish by not allowing Europeans direct access to those stocks. As the industry expands, the cost function would shift downwards reflecting reduced production costs and greater sales of U.S. product would result. It is unlikely, in the near future, that the U.S. industry could capture a major share of the market for Atlantic mackerel. However, as the infant industry expands to fill the residual demand and markets are penetrated by U.S. processors, the possibility of capturing a share of the larger market increases.

While there is not enough data available to allow for a formal benefit-cost analysis, information that is useful for policy analysis can be obtained from following the structure of a formal benefit/cost analysis using data from recent industry performance and some assumptions as to what might be reasonable for the mackerel fishery in the future. Consider Table 1:

Table 1. Change in Economic Value with a Zero TALFF Policy.

COST

TALFF 30,000 mt
Fee $58/mt
Value $1,740,000

BENEFIT

Domestic Harvest - assumed to grow at 20% per year
Landings 16,647 mt
Profit $55/mt
Value $915,585

Joint Venture - assumed to decline at 50% per year
Catch 11,077 mt
Profit $28/mt
Value $304,618

Interest rate assumed 5.00%.

Year	Domestic Harvest (mt)	Joint Venture (mt)	Net Value ($)	Net Present Value ($)	Growth Net Value ($)	Growth Net Present Value ($)
1	16,647	11,077	-519,798	-519,798	-519,798	-519,798
2	19,976	5,539	-488,989	-938,573	-575,989	-1,017,484
3	23,972	2,769	-345,403	-1,236,945	-523,753	-1,469,922
4	28,766	1,385	-119,792	-1,335,498	-394,059	-1,794,116
5	34,519	692	177,596	-1,196,347	-197,385	-1,948,772
6	41,423	346	547,788	-787,580	67,058	-1,898,733
7	49,708	173	998,682	-77,835	406,915	-1,609,546
8	59,649	87	1,543,086	966,586	834,732	-1,044,566
9	71,579	43	2,198,038	2,383,461	1,367,265	-163,215
10	85,895	22	2,984,812	4,215,877	2,025,501	1,080,267
11	103,074	11	3,929,358	6,513,292	2,835,082	2,737,881
12	123,689	5	5,063,022	9,332,572	3,827,031	4,868,915
13	148,426	3	6,423,522	12,739,103	5,038,732	7,541,062
14	178,112	1	8,056,175	16,808,018	6,515,145	10,831,653
15	213,734	1	10,015,383	21,625,589	8,310,302	14,829,051
16	256,481	0	12,366,447	27,290,801	* * *	19,634,234
17	307,777	0	15,187,730	33,917,157	* * *	25,362,604
18	369,332	0	18,573,273	41,634,736	* * *	32,146,045
19	443,199	0	22,635,926	50,592,540	* * *	40,135,284

For purposes of discussion assume that foreigners would take 30,000 tons of TALFF if given the chance. Using the last available poundage fee of $58.00 (56 FR 59920), this would generate a gain to the US economy of $1,740,000 annually. In this hypothetical case, then the cost of a zero TALFF policy would be $1,740,000 a year. This ignores any cost of collecting the fees. Since it is difficult to estimate such costs the gross figure will be used in the analysis to follow. It should be remembered, however, that the costs are likely overestimated.

In 1991 the US industry produced 27,724 tons of mackerel of which 11,077 was JV over the side sales. If, as industry participants say, the profit per ton for domestic production is $55, and the profit for JV is half that, the total net value of domestic harvest is $915,585 plus $304,618 or $1,220,203. If a zero TALFF is necessary to maintain this production for the coming year, the net annual cost would be $519,798.

The question is how will this annual cost change if the industry grows. For purposes of discussion assume that domestic production will grow at 20% a year in the absence of TALFF, and just to be conservative, that JV production will decrease at the rate of 50% a year with no TALFF. This pattern of growth is listed on the bottom of Table 1 for a twenty year period. Note in the third column, that by the year 5, when domestic landings have increased to 34,519 tons, that the profits to the industry are larger than the losses from poundage fees, and the annual returns from the TALFF policy turn positive. While no one can be sure that the landings will get this high, it is not an outlandish or an unreasonable estimate of what could be produced with a no TALFF policy.

The fourth column contains the net Present Value (NPV) at 5% of the annual effects up to the current year. For example the NPV for the losses of the first three years is $1,236,945. Note that the NPV turns positive in the eighth year when landings have increased to 59,649 tons. Here again, landings of this size do not seem unreasonable. Similarly, a eight year wait to obtain a positive NPV is certainly reasonable.

The above assumes that TALFF stays at 30,000 tons over the period of analysis. It is possible of course that as the world economy grows, that the amount of TALFF desired will increase. Assuming that TALFF grows at 5% per year, the change in annual net values and NPVs are demonstrated in the last two columns. It takes six years before annual net value is positive and ten years before the NPV of the no TALFF policy is positive.

Similar analyses were developed for different assumed levels of TALFF. If TALFF is less than 21,037 tons, the annual effects of a no TALFF policy are positive in all years. At the other extreme if TALFF is 50,000 tons, then with the assumed growth rates of the domestic industry the annual effects are positive in eight years and the NPV will be positive in 13 years. The results are similar if it is assumed that TALFF grows over the period of analysis. For comparison purposes, the highest actual TALFF taken that we have a record of was approximately 37,000 mt.

While this analysis does not prove that a no TALFF policy would generate net economic benefits for the nation, given the level of information available it strengthens the case for advocating such a policy. It shows that over wide range of potential TALFFs, if the industry can grow at 20% annually, even with decreases in JV, it does not take very many years for the annual effects to become positive. Further, even if industry growth stops at this point, the NPV of the policy will become positive at some time in the future. If the industry continues to grow, the NPV will be positive in about a decade. Remember that these conclusions follow even though the cost of collecting the fees was ignored. Additionally, no attempt was made to consider multiplier effects for the development of the US fishery on the US economy generally.

Benefit Cost Analyses of Other Alternatives

As an expansion of the analysis above, four alternative actions, in addition to the status quo, were considered. A proximate status quo or "base case" was determined for the fishery using average landings of 45,000 mt based on the period 1989-1991. Furthermore, these landings were distributed according to the 1990-1991 catch rates, resulting in a status quo of 8,000 mt TALFF, 17,000 mt domestic production and 20,000 mt JV. The other alternatives considered were:

No TALFF; initial DP of 21,000 mt; initial JV of 24,000 mt.

TALFF of 10,000 mt for 2 years; initial DP of 16,000 mt rising to 21,000 mt in the third year; initial JV of 19,000 mt rising to 24,000 mt in the third year.

TALFF of 25,000 mt for 2 years; initial DP of 9,000 mt rising to 21,000 mt in the third year; initial JV of 11,000 mt rising to 24,000 mt in the third year.

TALFF of 45,000 mt for 30 years with no DP or JV.

Each alternative was analyzed for four different scenarios as defined in the notes to Table 2. The scenarios reflect future conditions that may prevail in the fisheries, and range from no growth in total landings with static distribution of catch, to annual growth of 5% in domestic production and shifts of TALFF and JV to domestic production at 50% per year. A critical assumption in the analysis is that the initial distribution of total landings among TALFF, JV and domestic production is a zero sum game for all alternatives, based on a fixed demand for western Atlantic mackerel. If the demand for TALFF were assumed to be additive to JV and domestic production, then all TALFF allocated would have the effect of increasing net benefits by $58/mt. The benefit-cost model used to produce the computed net present values used a time horizon of thirty years and a discount rate of 7 percent in accordance with OMB circular 894 (revised October 29,1992). The fees and profits for the industry were the same as presented in Table 1.

As in the case of the model presented above, this analysis is only considered to be indicative of what might happen, since the dynamics of the fishery prevent certain predictions regarding future events. While the alternative actions can be controlled by fisheries managers, the scenarios are uncertain. The results of this analysis, presented in Table 2, indicate that: (1) Under conditions of no growth in production of the combined foreign and domestic segments of the industry, a large allocation of TALFF provides more net benefit than other alternatives (Alternative 4, Scenario A); (2) rapid transfer of JV and TALFF to domestic production (Scenarios C and D) yields about the same levels of positive net benefits for all alternatives, once the effect of growth is taken into account; and (3) under the condition of 5% annual growth in the domestic sector (Scenarios B and D, with or without rapid transfer of TALFF and JV to domestic production), allocation of TALFF at any level, including zero, would have very little effect on the change in net present value from the status quo.

The model presented for the preferred alternative, using an increase of 20 percent in annual domestic landings, would certainly yield the highest net benefits to the Nation. However, the fishery manager must determine what he believes to be the future rate of growth in the domestic fishery and to what extent TALFF might inhibit that growth.

Table 2. Comparison of Projected Changes in Present Value of Net Benefits from Status Quo[1] among Alternative Specifications for Atlantic Mackerel for 1996 for Various Scenarios. Present Value of Net Benefits in Millions of Dollars.

	Alternative[2]			
Scenario[3]	1 (O TALFF)	2 (10k mt TALFF for 2 yrs)	3 (25k mt TALFF for 2 yrs)	4 (45k mt TALFF for 30 yrs)
A	($2)	($1)	($1)	$8
B	$9	$9	$10	NA
C	$5	$5	$6	$7
D	$16	$16	$16	NA

[1] Change in present value of net benefits was calculated as the present value of net benefits under an alternative and scenario less the present value of net benefits for the status quo alternative. The status quo was assumed to reflect average landings over the period 1987-91 (45,000 mt) distributed according to the catch pattern in 1990-91 (TALFF: 8,000 mt or 18%; Domestic Production (DP): 17,000 mt or 37%; Joint Venture (JV): 20,000 mt or 45%).

[2] The alternatives evaluated were:

1 - No TALFF; initial DP of 21,000 mt; initial JV of 24,000 mt.

2 - TALFF of 10,000 mt for 2 years; initial DP of 16,000 mt rising to 21,000 mt in the third year; initial JV of 19,000 mt rising to 24,000 mt in the third year.

3 - TALFF of 25,000 mt for 2 years; initial DP of 9,000 mt rising to 21,000 mt in the third year; initial JV of 11,000 mt rising to 24,000 mt in the third year.

4 - TALFF of 45,000 mt for 30 years with no DP or JV.

[3] The scenarios assumed for each alternative were:

A - No growth in total landings and distribution of landings unchanged from initial distribution.

B - Annual growth of 5% in DP.

C - No growth in total landings and TALFF and JV transferred to DP at 50% per year.

D - Annual growth of 5% in DP from initial level plus TALFF and JV transferred to DP at 50% per year.